The Veterinary Record

FOUNDED BY WILLIAM HUNTING, F.R.C.V.S., 1888.

No. 37. SEPTEMBER 10, 1932. VOL. 12.

N.V.M.A. Congress Papers

No. 3.—ANÆROBIC INFECTIONS OF SHEEP AS SEEN IN THE ROMNEY MARSH*

A. D. McEWEN, B.Sc., M.R.C.V.S.

SOUTH-EASTERN AGRICULTURAL COLLEGE, WYE, KENT

The pastures of the Romney Marsh are particularly suited for the grazing and the fattening of sheep, but it is recognised that sheep on these pastures are more subject to acute and fatal diseases than sheep grazing on other parts of Kent and Sussex. Various hypotheses have been advanced by the laity to account for these diseases, but none has been founded on experimental data. The diseases are grouped by the Marsh graziers and shepherds into two classes termed "struck" and "gangrene" or "ganger" respectively. The former disease was reported by Cave† (1905) to be similar to blackquarter in cattle and caused by the blackquarter bacillus. His work gives us the first conception that anærobic bacteria are responsible for disease in sheep on the Romney Marsh.

In 1930 the present writer took up the study of "struck" and "gangrene" and in this paper the investigations of the past two years are summarised. The anærobic bacteria have been found to play a most important part, but they cannot be held responsible for all the acute cases of disease encountered. The investigations touch the surface of the problem; there has been no attempt to grapple with the fundamental reasons why diseases common on the Marsh do not occur or occur but rarely in the neighbouring country; they throw no light upon questions as to whether the soil of the Marsh is peculiarly adapted to the subsistence of pathogenic anærobes, nor do they explain the influence, if any, the pasture may have upon the growth of these bacteria in the alimentary canal of sheep.

The Romney Marsh is roughly triangular in shape and covers an area of about 120 square miles. On two sides it is surrounded by sea, while the remaining boundary is formed by the River Rother and the disused Military Canal which runs from Hythe and joins the Rother a few miles above Rye. Behind the canal, for the greater portion of its length, the ground rises abruptly to a height of 150 to 200 feet, and portions of this represent the ancient sea cliff, the Marsh having been reclaimed from the sea, the eastern and larger portion in pre-Roman days, the western portion at a later date. About the 13th century the River Rother, which ran into the sea near New Romney, sought a more westerly course and between the 13th and 16th centuries reclamation extended in a westerly direction. At the present day the process continues along the course of the river below Rye. The soil of the Marsh is alluvial, the greater part being a rich loam, but considerable variations ranging from a heavy loam or clay to a light sand are to be found. The land is almost perfectly flat. It is intersected by drainage, sewers and ditches, controlled by a Board empowered to levy rates for their maintenance, and so efficient is the drainage that it is quite misleading to term the land a Marsh, the ground being remarkably dry even in wet seasons when it is often much dryer than the surrounding slopes.

Very considerable variations are shown in the sheep-carrying capacity of different Marsh fields. Adjacent fields, separated merely by a ditch a few feet wide, may show a difference amounting to two hundred or even three hundred per cent. Again, certain fields are noted for their ability to fatten sheep. The reasons for these variations are still not clearly defined.

The pastures are grazed by sheep throughout the year. During winter the breeding flocks and a number of wether sheep remain on the Marsh. Lambing commences in April, when the new growth of grass may be expected to stimulate milk production. At this time the numbers of sheep are suddenly increased by the return of the previous year's lambs, tegs, which had wintered elsewhere. Some of these young animals are fattened off on the best pastures during summer, others are retained for later sale or as recruits for the breeding flocks. At the beginning of September the lambs, about six months of age, are sent to winter on the uplands of Sussex, Surrey and elsewhere. The ground selected for these young animals has had a six months' rest from sheep, and is therefore comparatively free from infection with nematode parasites. Sheep on the Marsh depend

* Presented to the Experimental Pathology Section of the N.V.M.A. Jubilee Congress, Folkestone, August, 1932.

† CAVE, J. W., 1905, *J. Agric. Soc.*, 1, 230.

DEPT. OF VET. MEDICINE

almost solely upon grazing and the winter pastures would not support the entire stock. But when occasionally lambs are wintered on the Marsh they do not thrive; the reason for this is not accurately known, but it is probable that parasitism plays havoc with them. At this point it is interesting to observe that the sheep are all of the Kent breed or the first cross with some other variety. When the Kent blood is further diluted or when other breeds are tried, they do not thrive. For generations the Marsh sheep have been accustomed to very close grazing, the best sheep have been retained for breeding, and the weaker sold, and it has been suggested that by selection a stamina has been obtained which probably amounts in the adult animal to an enhanced resistance to gastric and intestinal parasitic nematode worms. Many sheep have been *post-mortemed* by me, but none has been found exhibiting gross evidence of these parasites.

Liver fluke infestation is not serious in normal years. During very wet seasons fluke has caused damage, but it is popularly believed that the year-old sheep brought the parasites with them from their winter quarters and that very little infection occurs on the Marsh. The comparative absence of liver fluke is not surprising because although the pastures are intersected by ditches containing fresh water, the sheep are exposed to limited risks as the ditches have steep sides and there are few swampy areas where sheep would graze herbage likely to be contaminated by encysted cercariæ.

The possibility of parasitic infestation having some bearing upon the rapid and fatal diseases of sheep has been kept in mind, particularly because of the well-established coincidence of black disease with liver fluke infestation in Australian sheep. However, no connection between parasitism and anærobic bacterial disease has been observed on the Romney Marsh.

On the Marsh the term "struck" is applied to all cases of sudden death except those following upon lambing, castration, docking or shearing, or from accidental causes, although even in the latter instance it may occasionally be more convenient for the shepherd to refer to a sheep as being "struck" rather than to admit that it died mislaid. Symptoms are generally overlooked, the animal being found dead. Descriptions of lesions are very confusing and putrefactive changes are generally described, but it may be noted that some of the older shepherds will relate how in bygone days if a sheep were found in time to "stick," that is to cut the throat while the heart was yet beating, the carcass could be dressed and made very presentable for town dwellers' consumption. These were obviously not cases of gas gangrene or blackquarter.

"Gangrene" is a well-chosen name and refers to a gas gangrene infection of the ewe shortly after lambing and to a similar disease of lambs after castration or docking, and occasionally of older sheep after shearing.

From preliminary enquiries made during a short visit to the district in 1928, I thought it probable that struck and "gangrene" were both gas gangrene infections resembling blackquarter in the bovine. Arrangements were made to have specimens of what were regarded as affected portions of muscle sent to me for examination. When pathogenic anærobic bacteria were isolated from these they were either *B. chauvœi*, *V. septique* or the *B. paludis*, described by me in 1930 and considered a new species. It is of the *B. welchii* type but produces a much more potent toxin. From some specimens no pathogenic bacteria were recovered. It became evident that material progress could not be made in the investigations unless there was the opportunity of examining cases personally. The opportunity arose in the spring of 1930. A small laboratory was prepared at Wye and investigations were commenced in March of that year.

INVESTIGATIONS ON "STRUCK"

The mortality in 1930 from what the laity call "struck" was high and *post-mortem* and bacteriological examinations of a considerable number of these cases showed that during that season the great majority of the animals died from a specific disease presenting well defined lesions. The term "struck" is in the meantime retained and used for this specific disease which is described below. In 1931 and 1932 mortality was comparatively low and a very much smaller proportion of the deaths were due to the specific disease. It is considered likely that in bad years the disease accounts for most of the deaths, but accurate estimates of percentage losses are not available.

There is general agreement that disease is most prevalent in early spring and that the incidence is intimately related to the amount of herbage on the pastures, and also to its early growth. When the late summer and autumn growth was poor and there is comparatively little grazing available during late winter and spring, deaths are expected, these generally reaching their peak in March and April, when the new grass is beginning to grow. From my own short experience I am in agreement with this view. In 1930, when losses were heavy, the winter grazing had been scanty; during 1931 and 1932 losses were light and the winter grazing preceding both these seasons had been relatively abundant. Further, it is considered that the disease is more likely to appear when the pastures are heavily stocked. In short, the

concensus of opinion is that "struck" in some manner or other is of dietetic origin. Frequently the carcasses of dead sheep are flayed, and cut up near the shepherd's house in a field where sheep graze; the skin is hung out to dry and the carcass fed to the sheep dogs, but there is no suspicion that ground is thereby being made more dangerous for sheep.

The comparative absence of alleged cures indicates the fatal character of the disease. Very exceptionally a sick animal is bled by the shepherd cutting the facial vein below the eye, but the treatment, based on the assumption that the animal has an apoplexy and that letting off blood is indicated, has few advocates. When, rarely, a treated sheep survives, success probably depends upon the operator inflicting his skill upon an animal temporarily deranged by some minor cause.

Symptoms.

Sheep of one or more years of age are affected, irrespective of sex. Illness when seen is of short duration—a matter of hours. Occasionally an animal may live for one or two days. Animals are dull, apathetic and dejected, neither feeding nor ruminating, but in the early stages it is only the very practised eye which detects abnormality, though the sheep may be found dead the next morning. Sometimes animals stand in a strained position, hind legs stretched out. The posture is probably due to an effort to relieve abdominal pain. The sick sheep is often butted by its fellows. Respirations may be accelerated.

Macroscopic Lesions, Post-mortem Changes and Bacteriological Examinations.

It is convenient to summarise these by dividing them into three groups, depending upon the time elapsing between death and the examination.

Group I, examinations made six or more hours after death.—Characteristic changes are found in the subcutaneous and muscular tissues which simulate in appearance a gas gangrene infection. In places the subcutaneous tissues are infiltrated with a reddish, gelatinous or fluid material. The muscles are soft and moist, light to dark red in colour and frequently mottled in appearance. Portions of these may appear riddled by gas. The intramuscular septæ contain accumulation of material similar to that found in the subcutaneous tissues. The peritoneal and thoracic cavities show turbid, blood-stained effusions. The liver is often foamy. The kidneys are soft, decomposed and the capsule separated from the organ by an accumulation of gas. The spleen appears rather large and puffy. The whole picture is one of rapid decomposition, but the changes in the muscles are reminiscent of *ante-mortem* lesions. Bacteria are abundant throughout the body. In the muscles they are present as a rich and frequently pure culture of *B. paludis*. The same bacterium is present in other organs, but in the organs in the body cavities a mixture of bacterial species abounds. *V. septique* has been isolated from a number of these cases and it appears to be a *post-mortem* invader.

Group II, examinations made between one and six hours after death.—These cases present a different picture from the foregoing. Advanced changes in the subcutaneous and muscular tissues are absent and generally these regions are normal in appearance. Large extravasations of fluid, light yellow in colour, slightly turbid and occasionally blood-tinged, are found in the peritoneal cavity. The peritoneal vessels are injected and conspicuous. There is a varying degree of congestion in the small intestine, and ulcers are sometimes present. The thoracic cavity contains an excessive quantity of fluid, but the organs therein present no striking abnormalities. *B. paludis* is distributed throughout the body tissues and fluids but not in great numbers.

Group III, examinations made at the time of death and up to one hour after death.—The *post-mortem* findings are similar to those of Group II, but the subcutaneous and muscular tissues invariably appear normal and the fluid in the peritoneal cavity is less turbid and either not at all or only very faintly blood-tinged. In some cases *B. paludis* in small numbers is present in the peritoneal fluid and in the lymphatic glands of the intestines, but absent from other body tissues. In other cases bacteria are found more generally distributed throughout the body, but in a few cases no bacteria are present, the tissues being sterile. Histological examination of the wall of the intestine shows necrosis of the more superficial epithelium, with engorgement of the vessels and hæmorrhage throughout the mucous membrane. When there is ulceration, bacteria, morphologically similar to *B. paludis*, may be found invading the tissues immediately adjacent to the ulcer, but in the absence of ulceration there is no sign of bacterial multiplication in the tissues of the intestine. The initial lesion is a necrosis of the mucosa of the intestine. This may be followed by ulceration. The ulceration may be due to bacterial invasion, but the initial necrosis is not attributed to that cause.

From these examinations it was considered that the characteristic lesions of "struck" were those of an enteritis and a peritonitis; that if the *post-mortem* examination was delayed the lesions were often obscured by putrefactive changes; that the changes occurring in the muscular and subcutaneous tissues stimulated gas gangrene in appearance and that formerly these had given rise to the view that

"struck" and blackquarter were the same disease. *B. paludis* was generally present in some of the body tissues and fluids at the time of death, and the *post-mortem* multiplication of this bacterium was responsible for the changes resembling gas gangrene lesions. The rôle of *B. paludis* in the disease was not clear; its absence from a number of typical cases suggested that it was a secondary, but not constant invader. Experiments were, therefore, undertaken to ascertain if the disease could be reproduced in healthy sheep by either feeding or inoculating them with material collected from field cases immediately after death. But the contents of the alimentary canal, the chopped-up, ulcerated small intestine and peritoneal fluids produced no illness when fed to experimental sheep, nor did the intravenous or subcutaneous inoculations of emulsified spleen pulp, mesenteric lymph glands and peritoneal fluid, nor the intra-peritoneal inoculation of large quantities of peritoneal fluid. From these negative experiments it appeared that the disease was not an inoculable one and it was most unlikely that it could be caused by a filtrable virus present in the body fluids or tissues.

The lesions and the recovery of *B. paludis* suggested that the disease was associated with the ingestion of the bacterium and with its multiplication in the alimentary tract. *B. paludis* rapidly produces toxin *in vitro* and were the bacteria in the alimentary tract to produce toxin, this might cause injury and, passing the injured mucosal barrier, give rise to toxæmia and death. If such were the case, the sterility of the tissues in some cases would be accounted for and the scanty number of bacteria found in other cases would be explained by the invasion of the tissues by *B. paludis* from an injured alimentary tract just prior to death. To test this hypothesis when suitable cases were found the contents of the alimentary canal were collected immediately after death and examined for *B. paludis* toxin. The ingesta were centrifuged to render them as free from particulate matter as possible and the supernatant fluid tested without further manipulation or in some cases after filtration, the material being inoculated intravenously into rabbits. When a sufficient concentration of *B. paludis* toxin is inoculated intravenously into laboratory animals or sheep it kills within a few minutes. It was, therefore, possible to test for toxin fluids which were not free from bacteria. The specificity of the toxin was determined by the neutralising effect of *B. paludis* immune serum mixed with the material to be tested. As a control some of the material plus normal serum, was inoculated into animals. In a number of cases *B. paludis* toxin was not found in the alimentary canal, but in two instances its presence was proved. *B. paludis* toxin has also been found in the peritoneal fluid, when it was impossible or difficult to demonstrate bacteria microscopically in the deposit of cells obtained by centrifuging the peritoneal fluid and the toxin could not have been produced by bacterial growth in the peritoneal cavity. It is possible that this toxin came from the alimentary canal. Toxin in the peritoneal cavity would explain the peritonitis which occurs independently of bacterial invasion of the peritoneum.

Further proof of the rôle played by *B. paludis* was furnished by producing the characteristic disease by feeding sheep with cultures of the bacterium.

Experimental Production of "Struck."

The initial feeding experiments were made with material collected from sheep dead for some time; this material contained large numbers of *B. paludis*. The experiments were inconclusive. Later experiments were made with laboratory cultures of the bacteria and these are summarised as follows:—large quantities of broth culture, 3 litres or more, when fed to sheep with a stomach tube, produce the typical disease.

Bacteria, collected by centrifuging broth cultures, resuspended in fresh nutrient broth and few to sheep in large quantities, produced the typical disease.

Bacteria, collected by centrifuging broth cultures, resuspended in physiological saline solution and fed in large quantities, did not produce any disease.

Toxin in broth culture filtrates was harmless when fed to sheep in excessive quantities, up to 6 litres, and a few hours after feeding the toxin it could not be demonstrated in the alimentary canal.

Nutrient broth when fed in excessive quantities was harmless.

It was considered that the specific disease comparable to that which occurs in the field had been produced by feeding the bacteria. Parenteral inoculation of the bacteria in very small amounts was fatal for sheep, but the disease produced was a typical gas gangrene with extensive lesions around the inoculated parts and differed entirely from that seen in the field. A possible objection to the claim to have produced the specific disease experimentally was the large volume of material and the great numbers of bacteria which had to be fed. It was, therefore, planned to test the effect of repeated small doses of *B. paludis* culture administered *per os* at intervals of one or two days, and sheep were carefully drenched with amounts of 50 c.c. of broth culture. The experiment was abandoned because in a number of cases the method of administration produced an inhalation pneumonia or gas gangrene of the lungs with extensive pleural effusions. The

amount of culture inhaled must have been small, because the sheep showed no evidence of coughing or respiratory distress when the culture was being administered. The inhalation disease differed from the disease seen in the field.

Bacteria were then collected from centrifuged broth cultures enclosed in small gelatine capsules and administered to sheep. The bacteria from 250 c.c. of broth cultures produced the characteristic disease in a considerable number of cases, and further, bacteria equivalent to 20 c.c of broth culture, when administered in capsules twice at an interval of 48 hours, produced the disease in a number of instances. Successful infection with these small doses may have been due to the bacteria having been carried direct to the abomasum and small intestine without the possibility of receiving injury in the rumen. If this were the case there was the possibility of setting up the disease in lambs with rudimentary fore stomachs by feeding them with milk containing bacteria which would pass directly to the abomasum. However, bacteria administered to lambs five times a day in this fashion for a number of consecutive days have not upset their health. If a bacterial toxin elaborated in a pabulum of food material in the intestine were the cause of disease there was the possibility of producing disease in lambs by feeding them with toxin, although this method had failed with adult sheep. But results were negative even when toxin in relatively large amounts was fed to fasting lambs, some previously prepared by administering ox bile by the stomach tube.

Before leaving the experimentally-produced disease, it should be recorded that on some occasions sheep fed late in the afternoon were found dead in the morning and no macroscopic lesions were found in these animals. The possibility of some factor other than the feeding of bacteria causing death seems to be excluded because immunised sheep fed in a comparable manner and at the same time survived. It is therefore possible that animals in the field may die from the disease and show no specific lesions.

In the natural disease it would be quite impossible for sheep ever to ingest the equivalent of 20 c.c. of culture. But in attempting to compare the experimental procedure with that which occurs in nature the following points present themselves. The fed cultures consisted of vegetative bacteria, in nature it may be sporulating forms which are ingested, and the latter state may favour the bacteria as regards viability and reproduction in the alimentary tract. The percentage of animals successfully infected when fed with bacteria in capsules was much higher than the percentage of naturally infected animals, and were hundreds of sheep to be fed with very small quantities of bacteria it is quite possible that the disease might be produced in one or two cases. Bacteria of the *B. welchii* type multiply in the alimentary tract, therefore it is reasonable to assume that the heavier the pasture is stocked and the closer the grazing, the greater would be the chance of sheep ingesting *B. paludis* and of an accumulating infection of the pasture occurring. It may be that some minor intestinal disturbance is required to permit the bacteria to set up the disease under natural conditions of infection.

To summarise, it may be said that the evidence from the field and from direct experimentation points to "struck" being primarily an alimentary infection.

Cases of Sudden Death called by the Laity "Struck" but of Unknown Ætiology.

These cases do not appear to be of very much economic importance, but they are of interest because hitherto they have afforded only negative information. When lesions are found they are in the alimentary tract and some cases may show extensive hæmorrhage into the small intestine. At the time of death the carcasses are sterile. Sections of the intestine have not shown bacterial invasion. Feeding stomach and intestinal contents and also the inflamed portions of intestine to healthy sheep has produced no effect. When violent inflammatory lesions are encountered corrosive mineral poisoning is suspected, but neither mineral nor alkaloid poisons have been found. Poisonous plants have not been incriminated. At the other end of the scale may be found carcasses presenting no lesions at all, and the cause of death is equally mysterious. None of these animals is tick infested. Wethers are affected as well as ewes. These cases are mentioned as a reminder that before concluding that all sheep in a district are dying from a specific acute disease a survey embracing many *post-mortem* examinations should be made.

Immunisation Against "Struck."

Rabbits and guinea-pigs were used in preliminary immunisation experiments; the former animals proved the more suitable. They responded well to the inoculation of *B. paludis* anatoxin and anaculture. The antitoxin in their serum was readily titrated against known amounts of standard dried toxin, by inoculating the toxin antitoxin mixtures intravenously into mice. Discounting considerable individual variations shown, the rabbits indicated that the immunity response was largely dependent on the amount of toxin originally present in either the anatoxin or anaculture, and the amount inoculated. Broadly speaking, the greater the amount in both instances, the better the response. These experiments were carried further

with sheep and similar results obtained. The immunity in sheep was valued by estimating the antitoxin content of their serum and also by submitting immunised and controlled sheep to experimental feedings and inoculations with *B. paludis*. Sheep showed individual variations, but it was clear that the amount of anatoxin inoculated, assuming this to run *pari passu* with the amount of original toxin, had a deciding influence on the degree of immunity produced; generally speaking, the greater the amount inoculated the better the immunity response. Immunised sheep withstood the administration of large quantities of culture by the mouth and the intramuscular inoculation of small quantities of *B. paludis*, while control animals treated in a similar way died within 15 hours. The immunity apparently declined considerably after four months.

Immunisation of sheep in the field has been practised on a small scale, inoculations of antitoxin alone being used. The size of the inoculation was adjusted for each batch of anatoxin so that each dose had originally contained a similar amount of toxin. Two inoculations were made, laboratory work having indicated that this was desirable. During the past season between 2,000 and 3,000 sheep were inoculated. In every field where sheep were inoculated a like number were left as controls. Fearing that the season would be a mild one, reliance was not placed on gross mortality figures for each group, vaccinated and control, but an effort was made to *post-mortem* every sheep that died during the twelve weeks of the year when the disease is most prevalent. As the total number of deaths in both vaccinated and control groups was small, no significance was attached to them. However, in no case was a *B. paludis* infection found in a vaccinated sheep, although in a few control animals the infection was identified.

Great care should be exercised in inoculating sheep on the Romney Marsh, otherwise some may contract an inoculation gas gangrene, owing to micro-organisms from the soil being carried into the tissues with the inoculum. This was demonstrated in 1931 when on one farm over 100 sheep were inoculated with *B. paludis* anatoxin and 15 per cent. died from gas gangrene. Bacteriological examination of five of these cases showed a *B. chauvœi* infection in four instances. The inoculations had been carried out in a muddy pound, the animals being inoculated in the inside of the thigh, apparently without paying due regard to ordinary sterility precautions. Our own practice is to impound the sheep on clean ground and inoculate them at some point along the back between the shoulder of the coxal tuberosity, and two or three inches from the middle line. One assistant restrains the sheep in a standing position and separates the wool, exposing a small area of clean skin. The skin is swabbed with spirit and the inoculation made. The method is particularly clean and reduces fatigue to the medium. I owe its inception to Mr. W. Fisher Hobbs, of Brookland, whose experience and observations have given him a unique insight into conditions predisposing sheep to gas gangrene.

GAS GANGRENE

This disease, locally termed "gangrene" or "ganger," follows a history of trauma, *e.g.*, lambing, castration, docking and shearing. The disease is recognised in other countries and *B. chauvœi* is regarded as the most frequent causal organism; but, as far as I know, no bacteriological studies of cases in this country had been made until these investigations were started.

With the parturient ewe the symptoms are usually seen on the second or third day after lambing. There is the usual evidence of general systemic disturbance; frequently the vulva and surrounding tissues are tumefied and dark in colour and drops of serous, blood-tinged fluid exude through the neighbouring skin. In other instances these distinct external manifestations are absent. The animals at this stage lie persistently, breathing becomes laboured, and as the shepherd says, "They begin to heave and then the sheep is considered as good as dead!" Death occurs comparatively soon after symptoms are seen, generally during the following night.

The disease is more prevalent during the latter half of the lambing season and once a case has occurred in a flock more are feared. Sheep receiving manipulative assistance at lambing are the more prone to contract gas gangrene, and there is circumstantial evidence that the shepherd, while assisting the ewe at lambing, may transmit infection from animal to animal.

At *post-mortem* examination the walls of the uterus are sometimes œdematous and greatly thickened; the tissues round the vagina may be infiltrated with gelatinous fluid material, reddish in colour. Blackquarter lesions are often found in groups of muscles, particularly those of the thigh or lumbar regions. When the carcass is fresh the great serous cavities and the organs therein show no particular abnormalities, but when the carcass has been lying for several hours, putrefactive changes due to gas-forming bacteria are very evident. The disease is variable in incidence, the average mortality is low but a 10 per cent. mortality in a flock of 300 ewes has been observed.

Lambs usually die on the third or fourth day after being operated on. There may be little external evidence of gas gangrene infection. Large areas of musculature may be involved, but these often show comparatively slight

microscopic changes, though in other instances distinct muscle lesions are observed.

Personal experience of cases occurring after shearing is not sufficient to justify generalisations, but the disease appears to be comparable to that seen in the parturient ewe and the lamb.

Interest centres round the bacteriological findings. Fifty-two cases of gas gangrene have been studied and the pathogenic bacteria from these isolated and identified. The conclusion is that *B. chauvœi* is the regular causal micro-organism. *B. œdematiens* has been incriminated once. *V. septique* has been recovered several times, sometimes along the *B. chauvœi*, but it appears probable that the former was merely a secondary invader. Although it is impossible to exclude *V. septique* entirely from the list of causal micro-organisms, it may be said, as with *B. œdematiens*, that it is not of very material importance.

There is unanimous agreement on the Marsh that the disease "gangrene" follows upon trauma but is not necessarily dependent upon laceration of the skin or mucous membrane. For example, it is said that on certain land there are times when the sheep will contract the disease if roughly handled or if they bruise themselves by knocking against a fence post. Again, more of the sheep shorn by certain shepherds have contracted the disease than those shorn at the same time and in the same place by other men. This has been attributed not to cutting of the skin but to rough handling, lesions showing at parts of the body held by the shepherd while shearing was in progress. Such cases have not been examined, but *post-mortem* examinations have been made on ewe lambs dead two or three days after docking with the hot iron, where the lesions did not affect the tissues near the tail but the musculature of the shoulders and neck, parts which would be subject to bruising with the shepherd's lamb hook without breaking of the skin. Is it possible that *B. chauvœi* may be present in a quiescent, probably sporulating, state in the sheep's tissues and trauma permits localised bacteria to germinate and produce gas gangrene?

As the disease is irregular in incidence, it is doubtful if owners would trouble to practise active immunisation against gas gangrene alone. However, with lambing ewes, the animal assisted by the shepherd is the more likely to contract infection, and if it were possible to give these a passive immunity by the inoculation of serum, individual cases would be treated. Immunisation experiments have, therefore, been concerned with the production of a *B. chauvœi* immune serum and its prophylactic use. *B. chauvœi* ovine strain immune serum was prepared and tested on laboratory animals and sheep. During the past two seasons shepherds on a number of farms have carried a syringe and serum and inoculated the ewes as they received manipulative assistance. As far as these inoculations can be assessed, they appear to have been of value. Laboratory experiments confirm the probable value of the procedure. The intramuscular inoculation of a lethal dose of culture of *B. chauvœi* followed immediately or a few hours later by 20 c.c. of serum inoculated subcutaneously has prevented the disease developing. Further, the inoculation disease may be allowed to develop until the inoculated limb is swollen and painful, and the sheep shows systemic symptoms; such animals would be expected to die in eight to twelve hours, but if inoculated intravenously with large doses of immune serum they will recover.

In the field the inoculation of affected lambs with serum is not likely to be attended with very good results because the disease is not recognised until advanced, when serum treatment as administered by the shepherd would be of very limited value.

If it were possible to actively immunise animals against " struck " and " ganger " by a combined simultaneous inoculation, it is probable that active immunisation would be more generally practised. It would be of interest to ascertain whether lambs born of immune ewes received passive protection by the ingestion of colostrum and were more resistant to gas gangrene than the lambs of susceptible animals.

In conclusion, a comparison of diseases of sheep in other parts shows that in Western Australia there is a disease similar to "struck" and attributed to a bacterium, *B. ovitoxicus*, resembling *B. paludis*. Quite independently, these diseases were both considered toxæmias, the toxin in both cases being postulated as originating from bacteria growing in a pabulum of the contents of the intestine.

B. paludis and the lamb dysentery bacillus are similar and closely related but, despite this, no disease comparable to lamb dysentery has so far been found on the Marsh.

V. septique has frequently been isolated from *post-mortem* material, but it has not yet been incriminated as the cause of disease, and no case resembling braxy or bradsot of Northern European countries has been encountered.

A bacillus apparently identical with the *B. œdematiens* type of bacterium, the causal micro-organism of black disease in Australia and similar to *B. gigas*, considered to be the causal organism of bradsot in certain districts in Germany, has been isolated but once from all the examinations made. There is no evidence of a condition resembling black disease occurring on the Romney Marsh; this is not surprising in view of the comparative absence of liver fluke.

These investigations on the acute diseases of

sheep on the Marsh have unravelled in some degree the more obvious threads of a hitherto practically untouched problem, and demonstrate the importance of the anærobic bacterial diseases in the sheep husbandry of the area concerned.

Discussion

Mr. McEwen's paper was the second to be discussed by Congress on the morning of Tuesday, August 9th, 1932, when Professor J. B. Buxton, M.A., F.R.C.V.S., D.V.H. (President of the Experimental Pathology Section), presided over a large gathering of members and delegates at the Town Hall, Folkestone.

Dr. R. F. Montgomerie, B.Sc., F.R.C.V.S., who opened the discussion, said:—

When I received the Provisional Committee's invitation to open this discussion I saw at once two very valid grounds on which I might ask to be excused—I cannot be regarded either as peculiarly experienced in the anærobic diseases of sheep or as particularly familiar with conditions on the Romney Marsh. My acceptance, then, arose partly from a desire to meet the wishes of those who have organised this Congress for us and partly because I have now an excellent opportunity of expressing my admiration for the excellent work Mr. McEwen has done in these last few years. While his earlier investigations were conducted at the Institute of Animal Pathology attached to the Royal Veterinary College, his later investigations bear the stamp of one who has come very directly in contact with his problems. I believe that Wye is very much in the Romney Marsh country and I think I am correct in taking these studies of "struck" and "gangrene" as excellent examples of what can be done in a relatively small "field" laboratory. In paying tribute to the quality of Mr. McEwen's work one must say how apparent it is that it has been backed up by clear thinking and sound reasoning.

Mr. McEwen has drawn what appears to me to be a good picture of conditions as they exist on the Romney Marsh and it is of first importance that every one of us should realise how different they are from those of our home districts. With great truth it has been said that the Romney Marsh, as a sheep country, is unique. Mr. McEwen has emphasised that to term this land a marsh is altogether misleading. When one remembers that portions of this land will fatten 10, 12 and even 14 sheep per acre one appreciates that its sheep husbandry is widely different from that of any other area. I had hoped that Mr. McEwen would discuss the reasons for this great superiority. Does it lie largely in the fact that for many years this land has been particularly well managed? Mr. McEwen has had us note that with the first growth of grass in April the Marsh farmer crowds on all the stock he can—his breeding sheep already on the land, his tegs returned from wintering on the uplands and such other sheep as he can purchase. He sets out, it seems, to keep his land closely grazed and his grass growing fast but never getting long. He has followed for many years the dictum, "Short grass is sheep's grass." Mr. McEwen has suggested that the wintering away of the lambs is due to the fact that when wintered on the Marsh they thrive poorly and that this bad thriving is due to parasitic infestation. May I suggest that this practice of off wintering of the lambs has arisen more from a desire to have at hand an ample and suitable stock for spring requirements? But Mr. McEwen tells us that when occasionally lambs are wintered on the Marsh they do not thrive. There is always a tendency to keep at home a bunch of culls which, in any case, would not thrive well and I would like assurance that lambs in good condition in September or October do not thrive if kept on the Marsh. If they do not, can one accept that "it is probable that parasitism plays havoc with them"? Of the many Marsh sheep *post-mortemed* at Wye none has been found exhibiting gross evidence of nematode worms. Would one not expect to find, at least quite often, ample evidence of parasitism among the lambs moved off in September and October were parasitic infestation the reason for the failure of lambs wintered on the Marsh? It is fashionable to-day to introduce the question of available mineral into any and every discussion, but it can, with good reason, be suggested that some shortage of mineral matter has influenced the methods of sheep husbandry on the Marsh. With the crowding on of the stock in spring the Marsh farmer keeps his grazing short and growing. For his ewes with lamb at foot he is catching all the mineral he can. When growth begins to tail off and finally more or less cease, the available mineral of his pasture, while sufficient for the breeding stock and fattening adult sheep, may be below the requirements of his lambs. Even if the quantity of keep is available, the quality may be short in some respect. Mr. McEwen may know of some work with figures which appear to contravert this suggestion, but it is difficult to accept them as evidence against this view and I know that there are similar circumstances in other areas where this explanation appears to hold good. There are questions of the availability and proportion of the minerals and the very interesting one of relative quantity: of the drop from high available mineral to a low level—all matters which cannot be adequately dealt with now. In fact, I may have left myself open to the accusation of drifting from the subject. Yet I do feel that in the conditions peculiar to the Marsh may be

found some explanation of the prevalence of these anærobic diseases of sheep—particularly "struck." It is daily becoming more apparent that there is room for much thought and careful investigation of the factors leading up to the production of disease in sheep by anærobes and that some of our accepted ideas must soon be set aside.

The picture of this disease, "struck," is so well and completely drawn in the paper that not one amongst us can be left in any doubt as to its type. It was surprising to me to find the *post-mortem* appearances of sheep dead six or more hours described at such length and before the appearances seen in sheep just dead of the disease. This sequence, however, does have the advantage of emphasising again the futility of attempting to tie down the nature of any sudden death disease of sheep by the *post-mortem* examination of animals dead even a few hours. On reading the appearances seen in the *Group I* cases one did expect a conclusion that this was a condition very like black-quarter of cattle, whereas the real nature of the disease is only evident from the description given under *Group III.* Here it becomes evident that the disease arises not through the invasion of the animal body by an anærobic bacterium but by the action of its toxin primarily, it seems, on the mucous membrane of the intestine but, in the main, after absorption into the animal body. We have now, through this work of McEwen and through that of Bennetts on *Infection Entero-toxæmia of Sheep* in Western Australia, emphasis placed on rather a new conception of the mode of production of disease in sheep by anærobic organisms. Hitherto, so far as I can gather, there was little inclination to accept the possibility of their producing toxin *en masse* in the alimentary canal or the absorption of that toxin, with one notable exception, through the more or less undamaged intestinal mucosa. In the Australian disease the mucosa appears to be even less damaged than it is in "struck." We now have these two very excellent pieces of work to prove the possibility, and the investigations of Gill in New Zealand, of Montgomerie and Rowlands in North Wales and of Oxer in Tasmania point very suggestively to the so-called pulpy kidney disease or diseases of lambs as of a similar nature. Bennetts, in a recent article, says that the presence of toxin in the bowel contents of cases of lamb dysentery apparently has not been investigated. We do not know if others have made observations on this point, but during the last two years we have repeatedly demonstrated the presence of a highly potent toxin in the filtered intestinal contents of cases of this disease. In each case this toxin was readily neutralised by *B. welchii* (*L.D.*) antitoxin whereas *B. welchii* and other antitoxins failed; the antitoxins supplied by Dalling. In fact, we now without any delay confirm our suspicion of the presence of lamb dysentery by this procedure. Admittedly in these cases a degree of ulceration of the intestinal mucosa was present and, so far, we have not had an opportunity to search for toxin in those very acute cases of lamb dysentery which show no macroscopic ulceration. If lamb dysentery is not a true entero-toxæmia, it is the half-way stage. This intestinal toxæmia conception of certain diseases has certainly come to stay. It may be that other diseases of sheep are similar in origin and that some of our well-known but little understood conditions of other farm stock will fall into this category. It is to be hoped, however, that in this matter fashion will not lead common sense nor theory pass proof.

Does "strike" occur outside the Romney Marsh? Many of us have in the past encountered at least small outbreaks of sudden death disease in adult sheep which were distinctly similar. Certainly in North Wales some of the loss among ewes in spring is due to a disease of this type. Generally one gets contact with cases only as *post-mortem* material of some age, but in 1931 we did succeed in having very recently dead or dying sheep from two small outbreaks and in each case media inoculated from body tissues and fluids remained sterile while the filtered intestinal contents were highly toxic on intravenous injection into rabbits, mice and, in the one sample tested, into sheep. One of these filtrates was put up against *welchii* (*L.D.*), *welchii, œdematiens* and *septique* antisera without evidence of neutralisation. It is possible, then, that we were dealing with a disease very similar in nature to "struck," perhaps related to a different species of bacterium.

Mr. McEwen has shown that by the feeding of very large quantities of *B. paludis* culture it is possible to produce typical "struck," but one wonders what the effect of giving similar quantities of the cultures of allied organisms would have been. I am not casting any doubt on the rôle he ascribes to *B. paludis* but rather question the value of these mass dosage experiments. He has, of course, reproduced the disease by feeding the bacterium in much smaller numbers. Apparently he has found it easier to set up "struck" by feeding *B. paludis* cultures than Bennetts found the reproduction of the Western Australia disease with *B. ovitoxicus.* In any case, it is recognised that "struck" has not been reproduced under the conditions which occur in the field. There is no evidence which would suggest that in nature the quantity of the organisms ingested has any bearing on the occurrence of disease, nor does quality—even allowing for the spore stage—seem to be the factor. It would appear that one may find in

conditions unconnected with the germ the key to the occurrence of "struck." There surely are barriers to the access of these toxin-producing anærobes to the point in the alimentary canal at which they can multiply and produce their toxin. McEwen has suggested some minor intestinal disturbance as the factor. I had expected that when he came to deal with this point he would have referred us to his opening paragraphs dealing with the conditions under which this disease occurs. Even from the early days it seems to have been recognised that "struck" was chiefly a disease of vigorous sheep, thriving and in good condition. Why is it that these diseases of anærobic origin all occur in the thriving sheep? This susceptibility of thriving sheep in good condition is certainly a predominating feature.

Bennetts has very fully discussed this question in his recent bulletin (No. 57 of C.S.I.R. of the Commonwealth of Australia). The condition investigated by him is so similar to "struck" that one may emphasise his findings that his organism, *B. ovitoxicus*, although commonly present in the soil of affected properties, does not occur in the small intestine of sheep dead or dying of other diseases although it may be isolated from the abomasum. We can expect that the Romney Marsh land is at least fairly heavily contaminated with *B. paludis*, that many sheep pick it up in grazing and that it is present in the abomasum of quite a number. Why, then, is it only in a few that it escapes the sterilising action of the abomasum to reach a site for good growth in the small intestine? Bennetts suggests that fat sheep feeding on an abundance of food of low fibre contents—young spring grass, for example—take little exercise and develop a temporary sluggishness of the bowel which permits spores which have escaped destruction in the abomasum to find time on reaching the intestine to germinate, multiply and produce their toxin. He considers the continuous ingestion of many organisms in the close grazing of heavily contaminated land as a less frequent predisposing factor and McEwen has noted that there is no evidence that mass contamination of the sites on which shepherds have flayed and cut up struck sheep are particularly dangerous. Bennetts' suggestions are more than interesting, particularly since they are backed up by experiments which do suggest that the simultaneous administration of drugs which tend to produce intestinal stasis enhances the chance of *B. ovitoxicus*, administered *per os*, producing the disease. Attempts to neutralise the acidity of the stomach did not have that favourable effect. Despite this evidence, and in view of other work, one still wonders if the nature and quantity of the protein intake—the grazing of quickly-growing, young grass—is not a major influence either as its digestion begins in the fourth stomach or, perhaps, as it is hastened in the small intestine. May it not be that in the change to digestion of this type of protein, or to excessive quantities of it, an altered condition of the abomasal contents or some departure from the normal breakdown products is produced which creates a particularly suitable pabulum for anærobic bacterial growth? We all know how frequently the changing of a flock to a fresh field, especially one with a quicker growing, fresh sward, is accompanied by a small crop of sudden deaths.

I have already taken so much of your time that I must leave to others more able than I that discussion of great bacteriological importance which can be ranged around the similarity and the differences which exist between *B. welchii* (*Lamb Dysentery*), *B. paludis* and *B. ovitoxicus*, and their relationship with *B. welchii*. The great importance of this matter is illustrated by Bennetts' observations. While antitoxins prepared from each of the three former organisms protected against *B. welchii* toxin, *B. welchii* antitoxin gave no protection against their toxins. Lamb dysentery antitoxin neutralised the toxins of *B. paludis* and *B. ovitoxicus*; paludis failed against ovitoxicus but neutralised L.D. Yet ovitoxicus failed to neutralise both L.D. and paludis. I do hope that some of those familiar with these organisms will treat us to their views.

I must pass quickly on to a short discussion of what Mr. McEwen has reported regarding his investigations of "gangrene," and it is of special interest to find quite definite evidence that *B. chauvœi* does not set up disease in sheep in at least one district of this country. Why is it, so far as we know, that this disease is more or less peculiar to the Romney Marsh, while black-quarter of cattle is so widespread? I have, however, heard of two farms in my district on which a clinically similar disease is said to occur. So far I have not seen a case. Its association with trauma is intriguing, more especially when we find that the trauma may be so simple as that produced in catching and handling sheep. Mr. McEwen raised the possibility that *B. chauvœi* may be present in a quiescent, probably sporulating, state in the sheep's tissue and that the trauma permits it to become active and produce disease. This is much in line with what happens in black disease of Australia. Both Edgar and Turner have shown that *B. œdematiens* spores are commonly present in the normal liver tissue of healthy sheep in black disease country. Turner's work has proved beyond all doubt that damage to the liver tissue by migrating young flukes permits germination of the spore and rapid multiplication of the bacterium. We will look eagerly forward to McEwen's work on the possibility

that a similar happening is the explanation of many of these cases of gangrene.

I would draw to a close with a reference to McEwen's work on preventive inoculations. It would seem that we must await the occurrence of a season in which " struck " is really prevalent before we have a full demonstration of the value of *B. paludis* anatoxin. One is tempted to seek Mr. McEwen's view as to the commercial possibilities of these vaccinations. Sudden death diseases in sheep are notoriously variable in incidence, so that while in one year the vaccination may prevent a probable 10 per cent. loss, in the next, or next few, it may be preventing only a probable 1 per cent. loss. Over a period of years would the cost of preventive inoculation exceed the value of the sheep saved? With the recent heavy fall in sheep prices this question is of paramount importance. It arises in quite a number of instances when protection against sudden death disease is proposed—even in braxy with its simplified preventive vaccination. It is indeed unfortunate that preventable loss from certain animal (particularly sheep) diseases continues to take its toll of the country's wealth largely because the cost of protecting the sheep in many flocks, when taken over a period of years, leaves little pecuniary advantage to the individual farmer. It almost seems that the profession as a whole must give serious thought to this great question and see that the country's wealth is conserved.

The unfortunate occurrence of 15 per cent. of deaths from " gangrene " among sheep inoculated with *B. paludis* anatoxin is a startling happening. Mr. McEwen has, with reason, blamed the technique employed, but I am tempted to ask if the trauma associated with the inoculation could not, *per se* and in view of his other evidence, be regarded as sufficient to stir up latent *B. chauvœi* infection in at least some of these Romney Marsh sheep. I have heard of somewhat similar accidents in the use of other material, but so far we have escaped their occurrence despite the carelessness which tends to creep in when the best of us pass our one-hundredth successive inoculation. We have for some years used the under surface of the tail as our site of inoculation—it was suggested to us by Mr. Dalling—and although it does seem an unsuitable place for such work we have, as I say, escaped trouble. I am sure that very many will carry home in their mind the site for inoculation which Mr. McEwen has suggested.

I think it will be agreed that, at least for the present, serum inoculation meets the need for the protection of ewes rendered liable to gangrene by assistance given at lambing. It is, however, very necessary to work out safe active immunisation for the general flock and for the lambs. Evidently Mr. McEwen's mind is travelling towards active immunisation against the two diseases by simultaneous inoculation of prepared products of *B. paludis* and *B. chauvœi* and his work on these lines will be followed with great interest. He also wishes to ascertain if lambs born of immune ewes receive a passive protection against " gangrene " by the ingestion of antibody-laden colostrum, as is the case in lamb dysentery. I hope that others will discuss this possibility, for my own view rather inclines to the opinion that the " kick " of a vaccination fairly close up to lambing would be necessary and that, despite the homologous nature of the vehicle carrying the antibodies, the immunity would be lost by the lamb at too early a date. It may, of course, just remain sufficiently long to assist in meeting the first possible attack of *B. chauvœi.*

I am well aware that this is an incomplete opening of a very valuable and interesting paper and it is my earnest hope that it will receive what it merits—a discussion quite overshadowing this attempt to set it going.

It must be obvious that I have schooled myself to keep this opening of the discussion within reasonable limits; to speak along one line only. I have attempted to avoid a repetition of what happened at Aberdeen when Mr. Tudor Hughes was " struck with the amount of gas evolved by these anærobes."

The Chairman observed that Dr. Montgomerie had dealt with the subject matter of the paper in a very comprehensive way, and had laid bare a vast field for discussion. He saw, and he was very pleased to see, such a large number of members who were interested in one or another aspect of that subject, and he asked them to proceed with the discussion.

Mr. F. H. Manley (Cyprus) said much had been made of sudden deaths of unknown ætiology in sheep, and he thought it might be of some interest if he read some notes he made last year of sudden deaths among sheep at Athalassa, brought to his attention. These were as follow:—

During January and February six rams died from a flock of 66 sheep. The flock was hand-fed night and morning and grazed during the day. Practically all animals in the flock showed some signs of diarrhœa which might possibly have been caused by the fresh grazing. A flock of 22 goats grazing in the same field exhibited no indications of illness.

Each of the six rams died suddenly and no definite symptoms were observed prior to death.

The *post-mortem* lesions found were practically identical in each case. They consisted mainly of a patchy hæmorrhagic inflammation of the small intestine (particularly the jejunum), a slightly swollen, friable condition of the spleen, marked degeneration of the kidneys, which were usually pulpy, some degenerative

changes in the liver, a slight inflammation of the mucous membrane of the abomasum, some hæmorrhages on the epicardium, and an intense inflammation of the trachea and bronchi.

In two instances sections of kidneys were examined, with the following results:—

(1) "The section shows a complete degeneration of epithelium lining the tubules in the cortex, the cytoplasm is granular and the nuclei have disappeared. The glomeruli are shrunken, but some of these cells contain nuclei. The stroma between the tubules is swollen and appears as a structureless mass. "In the medulla the tubules are less affected; they show cloudy swelling, but the nuclei are present, and the stroma is infiltrated by round cells.

(2) "Cloudy swelling and in places degeneration and disintegration of the epithelium of the tubules, especially the convoluted tubules. The ascending and descending loops of Henle are little affected. The epithelium of the glomeruli is not affected. There is no inflammatory infiltration. A few small scattered areas of fibrosis in the medulla."

All cultural attempts from the organs proved negative.

Spleen emulsion from two cases was inoculated subcutaneously into rabbits with negative results.

One ewe received spleen emulsion subcutaneously and another kidney emulsion subcutaneously. They exhibited no reaction.

Two sheep and one rabbit were inoculated intraperitoneally with spleen and liver emulsion with negative results.

A ewe was drenched with two pints of the rumenal contents from a carcass with negative results. Two rams were fed with intestinal contents and minced intestine from a carcass, with negative results.

Viscera from one case were examined by the Government Analyst and no metallic poison was detected.

Colonel Greenfield (Camberley) said he was sorry and somewhat ashamed to have to say that he was unable to lay before the Congress anything of great scientific interest on that matter of "struck." His predecessors had lived in that area for a good many generations, and some of them had been large sheep farmers in the Romney Marsh. His father-in-law was one of these, and he was rather pessimistic in his attitude, for he used to allow for a loss of 25 per cent. of his sheep in the Marsh, for the greater part of them he considered would be likely to die from "struck."

He was not quite clear, but he was under the impression that Dr. Montgomerie did not altogether agree with the essayist on the matter of removing sheep from pasture land, but the speaker thought the essayist was quite correct. The system throughout the Marsh, so far as he knew, was to crowd the animals on to the land early in the spring and to remove them at once in the autumn; the idea was to keep the grass as low as possible.

The only other point on which he could say anything was that, as a man of Kent, but a wanderer, he was under the impression that sheep farmers did not attribute their losses to "struck" elsewhere than in the Romney Marsh itself, except for animals which might have been there. The farmer to whom he was referring used to take his sheep always to the higher land of Kent in the region of Beckenham or thereabouts, and generally he used to consider he would have a few deaths from the sheep which had been in the Marsh in the summer, and would die from "struck" from that area.

Mr. W. Lyle Stewart (Newcastle-on-Tyne) expressed his appreciation of the paper, which gave an interesting first-hand account of certain diseases common in a district which was justly famed for the quality of its sheep. In reading Mr. McEwen's account of "struck," if he might say so, he wondered if there was not something unbalanced in our outlook regarding the causation of this and other similar sheep diseases. For example, in speaking of the cause of disease we were taught to look for a direct or actual cause (generally a bacterium or micro-organisms of sorts) and a predisposing or indirect cause or causes which were supposed to pave the way by some means or other for the pathogenic action of the bacterium. The important or deciding factor was, of course, the actual cause, and in taking this view he felt we were in danger of losing our proper perspective with regard to the investigation and solution of many disease problems.

The disease known as "braxy" or "sickness" was a case in point. The actual cause here was thought to be the *V. septique*, and certainly prophylactic treatment with this antigen was attended by satisfactory results, but this was by no means the only method of preventing braxy. It could equally well be prevented by feeding hay to the hoggs first thing in the morning. That organism had never fulfilled Koch's postulates in the strict sense, and it was fairly obvious that the predisposing cause or causes were equally, if not more, important than the actual cause. Naturally it mattered not where they broke the etiological chain of any disease. In braxy it was broken by vaccination, but in that case the natural death-rate was fairly high and vaccination became economically sound. In a disease, however, with a low mortality, as in "struck," it seemed very doubtful if vaccination would have any practical utility. The problem should be attacked in another way. Out of one hundred hoggs grazing on a braxy infected pasture, perhaps ten animals might die from braxy if they were untreated, but it was rather interesting to speculate on the ninety

that lived. Presumably all had had equal chances of ingesting the actual cause, but what condition or conditions in the animal body determined the onset of symptoms of braxy? Many theories, some plausible and others scarcely so plausible, had been advanced to explain that paving of the way for the toxic action of *V. septique*, but as yet there was no sound explanation. Certainly it would appear that the primary and important factor in determining the onset of braxy was some metabolic dysfunction, possibly of physiological origin, and that the action of *V. septique* was merely secondary, administering, as it were, the *coup de grace* to the stricken sheep.

The symptoms given by the essayist for "struck," the dulness, apathy, dejection, etc., were perhaps just a trifle unconvincing. To him they seemed to be the symptoms of any sick sheep, which might be noted anywhere in districts where "struck" was either not encountered or so called. From the other points of the disease enumerated by Mr. McEwen he agreed with those observers who thought that there was little to indicate that the primary cause of "struck" was other than a dietetic disorder giving rise to conditions in the gut favourable to the entry of anærobic organisms, which he would be apt to regard as secondary invaders. From his experience of diseases similar in many ways to "struck," probably the best results would follow from a more rational system of grazing. Young growing grass was too rich in crude protein for many animals and might give rise to digestive disorders. Also, it was essential that sheep should be forced under such conditions to take more exercise.

In conclusion, might he express his surprise on learning that the Romney Marsh was comparatively free of nematode parasites? In many other parts of the country modern methods of grassland management led to heavier stocking, and usually if the number of sheep was doubled the parasitic population was squared, because not only was the effective range of every sheep halved but the number of incubators for their development was doubled.

Mr. W. S. Gordon (Animal Diseases Research Association) said that he fully appreciated the difficulties with which Mr. McEwen was faced in the investigation of "struck" because of the variation in mortality from year to year. Mr. McEwen had isolated *B. paludis* and *B. chauvæi* from cases of "struck," and he (Mr. Gordon) thought it would be possible to prepare a vaccine which would protect against both organisms; it would, however, mean that the vaccine would be of the shot-gun variety.

In connection with the precipitating cause of anærobic infections in sheep, especially those attributed to infection from the bowel, many theories had been evolved, and much had still to be learned.

He had examined a number of cases of braxy in Scotland, and in every case so far *Vibrion septique* alone had been isolated. It was generally accepted that *Vibrion septique* was the cause of braxy, but no case of braxy had ever been produced by feeding sheep with *Vibrion septique*. It seemed that infection occurred by the organism gaining access to the sheep by the mouth, yet they could feed sheep by the stomach tube with massive doses of virulent culture without setting up the disease. It seemed that the same held good for "struck."

They had carried out an interesting experiment this year in connection with immunisation against braxy. In this experiment hoggs (one-year-old sheep) were brought from two farms and grazed on a farm where braxy occurred; on one of the farms ticks were prevalent, on the other ticks were not numerous. One-half of each group were immunised against braxy and the other half left untreated as controls. Deaths from braxy occurred in the untreated sheep whilst the vaccinated sheep remained healthy. The death-rate in the unvaccinated sheep was confined to the group of sheep from the farm on which ticks were prevalent. "We know (and this will be published later) that ticks may transmit a febrile disease which we have named 'tick-borne fever,'" said Mr. Gordon, "and it is thought that this disease may be the precipitating or primary cause of braxy infection." This type of infection was induced experimentally in sheep by inoculation of virulent blood prior to feeding the sheep with *Vibrion septique* culture, but unfortunately they had been unable to produce a case of braxy.

He thought the whole problem in braxy centred around the fact that they did not know the precipitating factor which enabled the organisms to gain access to the system, and doubtless the same state of affairs existed in the case of "struck."

THE REPLY

As no more speakers rose to take part in the discussion, the Chairman called upon Mr. McEwen to reply.

Mr. McEwen said that the title of his paper confined him to a limited range and therefore they were particularly indebted to Dr. Montgomerie and the other gentlemen who took part in the discussion, because they had to a considerable extent taken them beyond that narrow range though still confining themselves to cognate subjects.

The reason for sending the lambs away from the Romney Marsh during the winter was, no doubt, as Dr. Montgomerie had pointed out, because of the shortage of grazing during that

period, but if the lambs remained on the Marsh and obtained ample food they did not thrive, and the suggestion that the poverty of these lambs was due to parasitism appeared a reasonable and likely one. There was nothing to suggest that their unthriftiness was due to a mineral deficiency in the Marsh pastures. In 1911 and 1912 Hall and Russell published analyses of the soils and pastures of the Romney Marsh and from these there was no cause to suspect any deficiency. The Marsh pastures compared favourably with the best British pastures.

The supposition that the initial lesion of "struck" was due to a bacterial toxin in the alimentary canal fitted in well with the general pathological picture and the bacteriology of the disease and it was particularly instructive to find that Bennetts, in Australia, had come to a similar conclusion regarding a disease of sheep in that country.

Dr. Montgomerie's interesting work on pulpy kidney disease in North Wales and Gill's work on the same disease in New Zealand indicated that absorption of a toxin from the alimentary canal might be at play. Mr. McEwen had encountered typical pulpy kidney lesions in the aborted ovine fœtus when all the tissues were sterile. Such a case could not have been caused by a bacterial toxin produced in the alimentary canal, but the pulpy kidney lesions might be produced by more than one cause.

"Struck" occurred when the pastures were scanty and stocking was heavy and it was reasonable to suppose that under such circumstances the contamination of the pastures with anærobic bacteria capable of a saprophytic existence in the sheep's alimentary canal would be particularly heavy.

No evidence had been obtained to show that the diet influenced the susceptibility of sheep fed with cultures of *B. paludis*.

As the percentage loss in some years was very small and never reached a very high figure it was doubtful whether preventive inoculation would ever be generally adopted and there was little prospect of its ever being what Dr. Montgomerie called a commercial proposition. Colonel Greenfield had mentioned mortality on the Marsh amounting to 25 per cent. Mortality from all causes never approached that figure. A 10 per cent. mortality from all causes would be rare and exceptionally heavy.

Regarding the belief that the best sheep suffered more than others, Mr. McEwen did not regard this as necessarily the case with "struck."

Mr. Gordon had touched upon the question of immunising against more than one micro-organism at a time. Fortunately on the Romney Marsh it appeared to be necessary to protect against two only, *viz.*, *B. paludis* and *B. chauvæi*, and it appeared to be practicable to protect against both of these micro-organisms simultaneously. This made the prospect of the use of preventive inoculation more hopeful, as by the simultaneous protection against two diseases by the one inoculation expense and trouble would be reduced to the minimum and the farmers encouraged to avail themselves of prophylactic methods.

The meeting closed with a vote of thanks to Mr. McEwen.

A DESCRIPTION OF APPARATUS OF VALUE IN THE RAPID PERFORMANCE OF THE AGGLUTINATION TEST

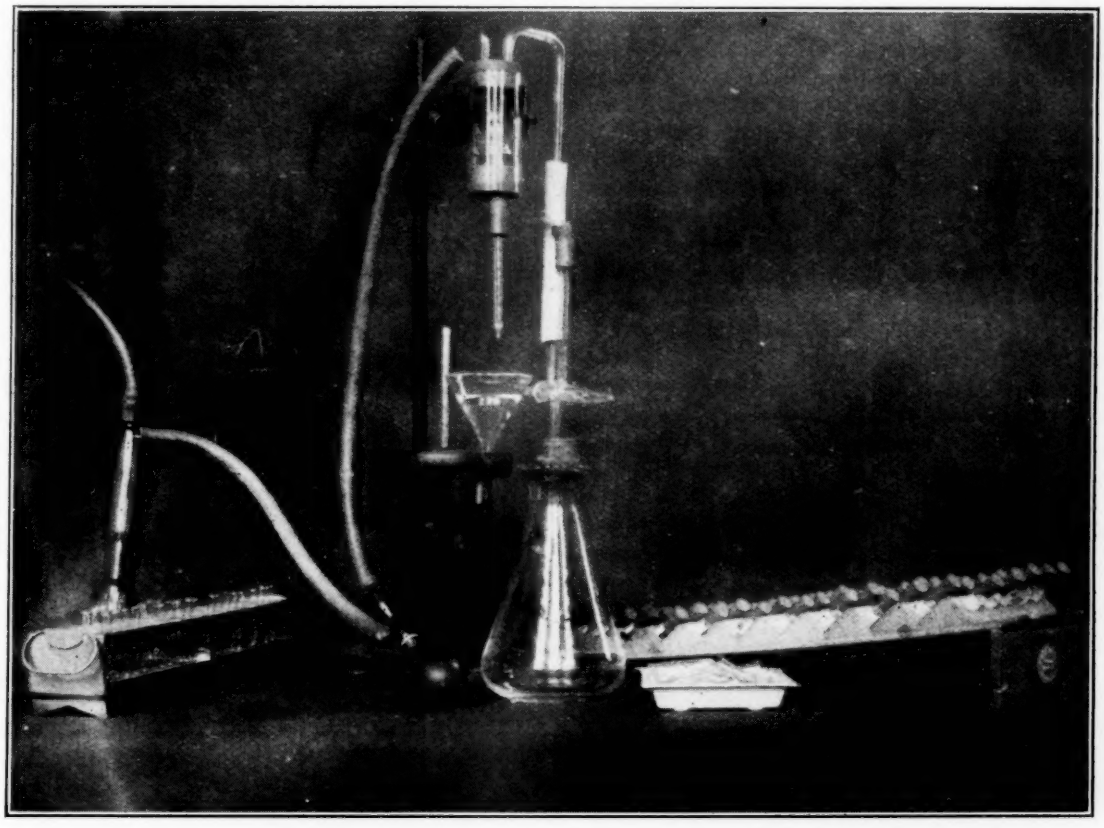
K. D. DOWNHAM, B.V.Sc., M.R.C.V.S., D.V.H.
Advisory Veterinary Officer,
West Midland Province,
and
G. H. BOTHAM, B.Sc., A. I. C.
Analyst, Harper Adams Agricultural College

In the control of bacillary white diarrhœa of chickens and contagious abortion of cattle a large increase in the number of agglutination tests carried out in veterinary laboratories has become necessary. This presents the veterinary worker with the problem of evolving a laboratory technique which is accurate, rapid and simple, together with efficient apparatus, if he is to accomplish such work with reasonable facility.

With the object of improving the methods in common use for carrying out the agglutination test, experiments with various types of apparatus have been performed in the Veterinary Department of this College. A simple pipetting apparatus designed by one of us (G.H.B.) on the lines of that first described by Beaudette, but with certain modifications, has been tested and found satisfactory in hastening the speed and simplifying the method of conducting the test.

Collection of Blood Samples for Agglutination Test for Bacillary White Diarrhœa.

The bird is held by an assistant, the wing raised and one or two feathers plucked from the area around the wing vein. The skin thus denuded of feathers is cleansed with alcohol and the vein is pierced with a needle with sharpened edges. A small incision, just large enough to permit the blood to flow freely, is made in the vein with the edge of the needle by an upward movement of the hand. About 1 c.c. of blood is collected in the sterile blood tube, fitted with a rubber bung. The tubes in use at present are of strong glass and are about



2 inches long and ¼ inch inside diameter, just large enough to allow of effective cleansing. It was found that, although instructions were given for the blood to be sloped immediately after the sample had been taken, to allow it to clot in such a way that the serum separated easily, this was rarely done. To eliminate this difficulty, a special box (shown in photograph) holding 50 tubes was designed by one of us (K.D.D.).

It consists essentially of ten cross pieces of wood fastened to a large flat board 18 in. by 5 in. Each of the cross pieces is bored with five holes at an angle of about 45° and after a sample has been withdrawn and the tube stoppered and placed in its proper hole, it is found that the serum has separated sufficiently well to allow of the laboratory work being commenced a few hours afterwards. To lighten the weight for postage, similar sloped sections composed of two rows of cardboard, one superimposed upon the other, with holes for receiving the tubes, have been found to be very serviceable. Sloping in the laboratory is thereby avoided, and in practice the serum pipetting can very soon be started after the arrival of the samples.

The Serum Pipette.

The main object of this apparatus is to cut out the use of large numbers of serum pipettes by arranging an efficient method of washing the bore of a single pipette (with phenol saline solution) between each sample. The apparatus is particularly suitable in cases where certain expensive equipment such as an electric vacuum pump is not available.

The essentials of construction are as follows.

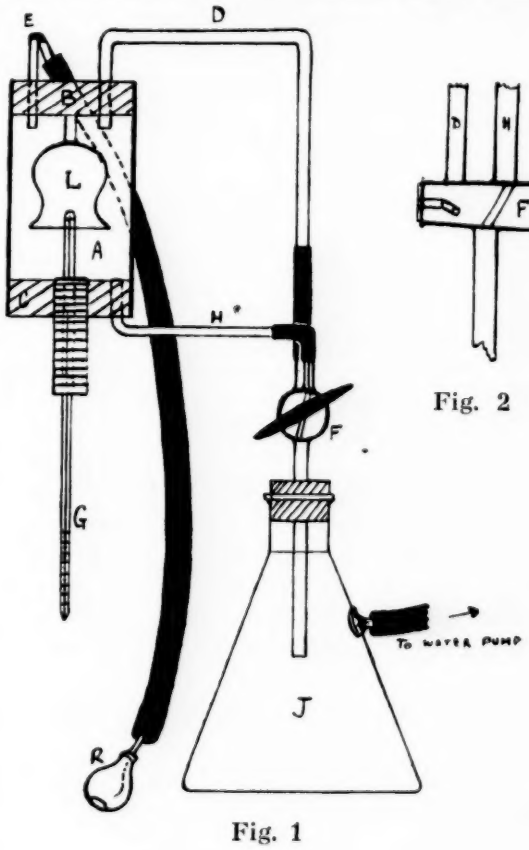


Fig. 1

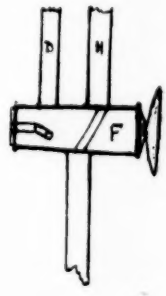


Fig. 2

A is a stout glass tube 3½ inches long and of 1½ inch internal diameter. It is fitted at its extremities with rubber bungs B and C each about ¾ inch deep. The upper bung B carries two tubes D and E, the former being bent twice at right angles and connected to one branch of a glass stop-cock F. The tube E is joined by a length of pressure tubing to the nozzle of a rubber bulb R (an ordinary small enema syringe bulb does quite well) which rests on the bench.

The lower bung C is bored eccentrically with a hole of ½ inch diameter, into which is fitted a piece of pressure tubing carrying a serum pipette G previously bevelled at its upper end by rubbing of a glass file. (This was found to be necessary in order to eliminate the possibility of a small amount of saline solution remaining on the top of the bore after irrigation.) About 1 inch of the pipette projects above the upper surface of the bung C. This latter also carries a tube A whose end is flushed with the top of C, and which is connected to the second branch of the tap F.

The tap F (Fig. II) is fixed in a rubber bung carried by the neck of a Buchner flask J which is connected to an ordinary glass filter pump.

The arrangement for washing the pipette is obvious from the photograph and needs no description.

The apparatus is set as shown in the photograph with the blood tubes on the operator's left and the agglutination rack on his right. A box containing the sterilised agglutination tubes is placed directly below the apparatus.

The pump is started and the tap F turned to make a direct connection between A and the pump *via* the flask J. When the funnel containing the saline is raised so that the tip of the pipette dips below the surface of the liquid, the suction created by the pump causes saline solution to be drawn rapidly through the bore. It impinges on a bell-shaped piece of glass L (the end of a thistle funnel) and is drawn off through H *via* the tap F into the Buchner flask. Only three to five seconds' irrigation is necessary, for during that time, at least 1 c.c. of wash solution (or about 100 times the volume of serum likely to remain in the bore) has passed through the pipette. On lowering the funnel, air is drawn through the bore so that by the time the blood tube has been uncorked, the capillary is left very clean and fairly dry.

The tap F is now turned through 90°, the chamber A being thus placed under atmospheric pressure at the same time as the suction is cut off. After another turn of 90°, the blood tube, held between the thumb and first finger of the left hand, is brought up to the pipette, the required volume of serum withdrawn and delivered into the proper agglutination tube held between the first and second finger of the left hand, by appropriate manipulation of the bulb R.

The authors are able to handle two samples per minute very comfortably and are confident that extended practice would enable this speed to be increased without incidence of slipshod work, or unsound technique. Risk of carry-over of serum from one sample to the next can be further minimised, when a large number of blood samples is being dealt with, by changing the pipette after every twenty or so. For this purpose we have half-a-dozen pipettes fitted with identical pieces of pressure tubing, slightly greased with vaseline so that they are rapidly interchangeable.

Antigen addition.—The following method of antigen addition has been in use for some time. A 1 c.c. syringe fitted with a two-way stop-cock is connected with a glass flask containing the antigen. This latter is put under considerable pressure by a rubber bulb similar to that attached to a milk fever syringe. Suitable manipulation of the stop-cock admits antigen to the syringe, the piston of which is raised just sufficient to admit 1 c.c. Another turn of the stop-cock cuts off the antigen supply and at the same time allows the piston to descend and deliver the 1 c.c. of antigen into the appropriate agglutination tube.

Summary

In this paper a modified technique for the agglutination test for bacillary white diarrhœa and contagious abortion is described, together with a rapid pipetting device and a special blood tube box for separating the blood serum. The use of the pipetting apparatus and blood box enables the operator to deal with a larger number of blood samples in a given time than when using the ordinary pipettes and blood sample boxes.

We are indebted to Morley Davies, Esq., M.A., for the photograph.

H.M. STATIONERY OFFICE PUBLICATIONS

The undermentioned have been published recently. Copies can be purchased through any bookseller, or directly from H.M. Stationery Office, at the following addresses:—London: Adastral House, Kingsway, W.C.2, and 28, Abingdon Street, S.W.1; Cardiff: 1, St. Andrew's Crescent; Manchester: York Street; Edinburgh: 120, George Street.

	Price Net. s. d.	*Post Free.* s. d.
Research:—		
Medical Research Council:—		
Special Report Series:—		
169. The Hæmolytic Streptococci: Their Grouping by Agglutination. July 21st, 1932. (45-5-69) ...	1 3	1 5
Agriculture and Fisheries, Ministry of:—		
Diseases of Animals:—		
Report of Proceedings under the Diseases Acts for the year 1931. (24-27-0-31) ...	2 0	2 2

Clinical Communications

NOTES ON CASES OF INTEREST*

LIEUT.-COLONEL A. F. CASTLE, F.R.C.V.S.,
Ipswich

I should like to thank the Committee, first, for the honour they have conferred upon me in asking me to contribute a paper at this meeting, and secondly, for suggesting that brief notes on cases of interest would be considered all that was necessary, as in these hectic days few of us have much opportunity to indulge in marked literary effort. I have therefore compiled a few hasty notes on cases which I hope may be of interest to you.

STERILITY IN THE COW

I have recently been approached by an enthusiastic owner of a pedigree herd of cows as to the desirability of applying diathermal treatment to cows in his herd, which have been heavily infected with a virulent type of contagious abortion and which, as a result, are suffering from sequelæ of this disease, such as cervicitis, leucorrhœa, metritis, or absence of œstrum. The owner has been very reluctant, even when an unfavourable prognosis was given some months ago, to dispose of cows where no improvement had resulted from the usual treatment of this disease. I consulted a medical friend of mine, who specialises in the diathermal treatment in the human subject, and claims successfully to treat women suffering from leucorrhœa, metritis and sterility by this means, and I have been strongly advised by him to give diathermal treatment a trial for my cases. For this purpose a modified apparatus was acquired from a firm who specialise in the making of these instruments.

The electricity is received from the main at the farm where I am carrying out this treatment, the electrical supply having a voltage of 250 and being connected by means of a wire to the special apparatus. From the latter two wires are attached, one to a leaden plate placed over a shaved area, about a foot in extent, on the back of the cow, the other to a cervical electrode, which is cup-shaped at one extremity, and introduced into the vestibule of the vagina during treatment. In medical practice it is claimed that the heat generated by this means is sufficient to clear up any cases of cervicitis, and that in ovarian disease the degree of heat passing through the pelvic contents is sufficient to restore these organs to normal. Treatment consists of twenty minutes' application on alternative days, and is sufficient to raise the temperature in the vagina or uterus from 110 to 125 degrees, depending on the size of the electrode and the number of amperes used in the treatment. No uneasiness has been noticed during the application of the treatment, the patient usually continuing to feed or ruminate. A range of 1·6 to 2 amperes is considered advisable in the treatment of the cow; a thermometer is incorporated in the vaginal electrode, which registers the temperature in that organ.

We are at present only in the experimental stage, and unfortunately I have only been able to give the cows four applications of this treatment to date, but in all cases the character of the discharge has become altered, being thicker and more tenacious in character and markedly decreased in quantity. The colour of the discharge has changed from yellow to deep brown. I shall, at a latter date, if this treatment is successful, publish results of same, but at this stage I should be glad to know if other practitioners have obtained any success with this line of treatment. My medical friend regards diathermal treatment as a panacea for all vaginal and uterine disorders and also considers it the most successful treatment for gonorrhœa in the male.

The term " diathermy," which means " through-heating," was introduced to describe the physical effect of passing an electric current of a special kind through the body. The current generates heat along its path, so that, when it traverses the body, not only the skin but the underlying parts are heated. The tissues are therefore heated throughout, not merely on the surface; that is to say, diathermy is produced.

The customary methods of applying heat to the body for therapeutic purposes do not produce diathermy. In these methods the heat is derived from some external source: an object which is heated to a higher temperature than that of the body is placed either in direct contact with the latter or at a distance from it. In the first case the heat is conveyed to the body by conduction, in the second by radiation. By neither of these processes is it possible to raise the temperature of the tissues which lie more than a slight depth below the surface.

The heat (infra red) waves, however, penetrate for a very short distance only, probably not further than the skin, so that the latter alone is heated directly; further spread must be by conduction and impeded or prevented by the circulating blood.

To produce diathermy, an electric current of a special kind is passed through the part which is to be heated. It is well known that when a current passes along a conductor heat is developed, the amount or depth of heat depending on the resistance of the conductor and the intensity of the current.

The body is a conductor of electricity, although its resistance is high, and if it is traversed by a

* Presented at the Summer Meeting of the Eastern Counties Division, N.V.M.A., Great Yarmouth, July 15th, 1932.

current, heat will be developed in it. If the current is of sufficient strength the heat can be perceived by the body and measured by a thermometer. The heat is, by this method, *actually generated in the tissues along the path of the current*, and not, as in the old method, conveyed to the body ready made, from an external source by conduction or radiation.

By the electric current the heat is generated in all parts traversed by the current so that the tissues are heated directly, simultaneously and throughout.

NERVOUS SYMPTOMS IN HEAVY MILKING COWS

I should like to bring to your notice a nervous affection in deep milking cows, which until recent years had not been observed or remarked upon, but has been described under the term "Lactation Tetany." Symptoms usually appear three to four weeks after calving, when the cow is in full milk, and the condition has only been seen in heavy milking cows giving a thousand to fifteen hundred gallons in the lactation period. It may vary from a slight excitability on the part of the patient to a marked aggressive inclination in animals which previously had been most docile. The symptoms are, as previously stated, marked excitability, dilation of pupils, suspension of rumination, marked dimunition in milk supply, and tendency to constipation. The ears are frequently twitched and the cow restless and excitable; in one case slight inco-ordination of the hind extremities was present. The course is usually three to four days, and is followed by recovery when suitable treatment is adopted.

Treatment.—A full dose of aperient medicine, followed by the administration, twice daily, of two-ounce doses of calcium glucose, usually brings about recovery. In one case, recently encountered, the animal would not allow even the attendant to enter the box, and rushed at the top door at every attempt at entry being made. When observed from the adjoining box it attempted to climb up the wall. In this case treatment consisted of four-ounce doses of calcium glucose twice daily in the food, and was followed by a return to normal of the cow after six days' treatment. This disease is undoubtedly due to some deficiency, probably calcium, as a result of the depletion owing to the heavy milking propensities of the affected animals.

DIABETES IN DOGS

I have recently had three cases of this disease under treatment, two of which ended fatally after four to six weeks' treatment. The surviving case is in a wire terrier bitch, eight years old, which is receiving ·5 c.c. insulin twice daily and has been placed on a restricted diet of fish, tripe, toast, biscuit made with special flour, Vichy water and milk, orange and grape juice. The excessive thirst has disappeared and the animal increased very much in weight; in fact, an increase of 12 oz. was recorded after the first day's special dieting and treatment had been adopted. The animal is weighed daily. I might add that sugar in pathological quantities were demonstrated in each case prior to the commencement of treatment. The usual symptoms of wasting, lassitude, excessive thirst, and passage of large quantities of light-coloured urine were present, as also was double cataract in each case. Both my fatal cases previously referred to ended in coma, in spite of sugar in large doses and six times the normal injection of insulin being given immediately this untoward symptom arose.

THE SIGNIFICANCE OF JUGULAR PULSE IN HORSES

I should like the opinion of members of this Association on the significance to be attached to the presence of the jugular pulse in the horse. In examining horses for soundness, a large proportion of animals will be shown to evince evidence of jugular pulsation in the lower portion of the neck, even whilst at rest. This symptom is frequently present in the unfit horse, but it is this condition in horses which are considered fit, in which I am specially interested. Are we to regard any evidence of a pulse in the jugular vein as an unsoundness? If we are, then very few horses will pass this standard. A large percentage of point-to-point horses, hunters and ponies five years old and upwards will be found to exhibit this irregularity, at rest.

I should like to quote the late Major-General F. Smith on Pulsation in Veins. "Veins are normally pulseless, but an exception must be made to this statement in the case of the lower extremity of the jugular, just where they enter the chest. It is quite common in the horse to observe pulsation in these vessels for an inch or so up them, due no doubt to the action of the tricuspid valve. It is, however, distinctly abnormal for these venous pulsations to extend any distance up the neck, for then it indicates insufficient closure of the tricuspid, due to a debilitated state of the system or actual disease of the valve itself, which latter in the horse is a rare condition." Of forty-two cases of heart disease in horses as recorded by a German observer, thirty-eight, on *post-mortem*, were found to have the aortic valves diseased, and four to be suffering from disease of the aortic and mitral valves.

Frequently in hunters jugular pulsation may be seen to extend nearly one-third of the distance up the neck after a good gallop. These animals have never been inconvenienced as a result of continued exertion, such as a day's hunting, and can gallop in deep going, and their staying powers appear to be absolutely unaffected. On return to the stables, after a day's hunting, they feed normally, in marked contrast to the horse suffering from incipient valvular disease, which, after

a day's hunting, is disinclined to feed. Probably at this stage the latter horse does not show fatigue whilst out hunting. The majority of cases of heart disease which end fatally in the hunting field or cause the subject to pull up in deep going or after prolonged exertion, will be found, on *post-mortem*, to exhibit well-marked dilation of the heart; tricuspid or mitral insufficiency may, however, be present. In my experience most cases of jugular pulse in the horse are accompanied by a cardiac murmur after the second heart sound, which is readily discernible with the stethoscope, whilst the animal is at rest, and I should not hesitate to reject any horse displaying this irregularity. When, however, the pulsation in the jugular vein is restricted to the region of the lower third of the neck, even after considerable exertion, as that entailed by a good gallop, and no abnormal cardiac sound is detectable on examination with the stethoscope, and the respirations are only such as one would expect after effort, one is frequently left in doubt as to whether or not any strain of the tricuspid or semilunar valves is present, in spite of the absence of the usual cardiac murmur associated with these conditions. Many horses suffer from strained valves as a result of a gruelling finish over a stiff course, which disability remains with them for all time.

ŒSOPHAGEAL OBSTRUCTION IN WIRE-HAIRED TERRIER

The next case concerns one of my own wire-haired terriers. On the night of May 9th, I went out to the stables accompanied by the little bitch, who was carrying a portion of a lamb-bone, and in her excitement on seeing a rat, swallowed the bone without previously masticating it. She at once cried out, but continued to hunt for the rat. About half an hour later she evinced signs of pain by crying and showing marked signs of lameness in the right fore limb. I examined the pharnyx and palpated the stomach, but could find no trace of injury; examination of the cervical portion of the œsophagus was also without result. As the little animal still showed signs of uneasiness I gave her an hypodermic of apomorphine hydrochlor., hoping it might result in vomition of the bone. Emesis occurred on several occasions, but did not have the desired effect, and as the bitch was still uneasy I gave her a half-grain of morphia and left her for the night. Next morning, although not quite so bright as usual, she was running about and had taken a quantity of milk, but it was noticed that the head was abnormally depressed at intervals, and that the lameness of the right limb was still present. During that day she continued to take milk, but was disinclined to eat even semi-solid food. I therefore passed the probang and at some distance down the œsophagus, estimated to be in front of the diaphragm, some slight resistance was encountered, but the probang uninterruptedly entered the stomach. There was no evidence of hæmorrhage, or the presence of any blood, revealed by the probang. No blood had been seen in the vomit on any occasion. During the next two days the bitch appeared to improve and took meat jelly, cornflour, milk, and shredded meat in considerable quantities, but on attempting to eat steamed fish on two occasions, symptoms of pain and attempts at vomition occurred. On May 13th the radiologist at the local hospital kindly undertook to take skiagrams of the bitch. The piece of bone, upper epiphysis of the right tibia, is readily seen in either skiagram, which I will pass round for your inspection and remarks, and from its position I regarded the case as hopeless. I candidly admit that I did not like the idea of attempting gastrotomy and endeavouring to secure the withdrawal of the bone through the œsophagus into the stomach, but I have since been assured by a well-known canine surgeon that that was the only practicable measure to be adopted for the relief of this condition. The little bitch died the following day, when a *post-mortem* revealed commencing pleurisy on the right side, and a localised necrosis of the dilated œsophagus at the seat of the obstruction. Death was virtually due to septicæmia.

INTUSSUSCEPTION OF THE BOWEL IN SWINE

Intussusception of the bowel in swine is frequently met with in swine fever, or as the result of enteritis, accompanied by diarrhœa, but I am of opinion that this lesion occurs *post-mortem* in a large number of cases. On examination no congestion, inflammatory process or pathological condition is apparent and the intussusception is readily reduced. When the lesion has occurred *ante-mortem*, adhesions or definite pathological changes are evident in the parts affected. I am also of opinion that this *post-mortem* lesion occurs in the dog.

VOLVULUS IN SWINE

On *post-mortem*, volvulus of the small bowel is not uncommon and, in my experience, most frequently affects pregnant sows which are well towards their full term of pregnancy. It is difficult to understand why the pregnant sow should be liable to this condition, as this disease is not often seen in the pregnant mare. I realise that the distribution of the bowels is totally different in the two animals, and might be a considerable factor in the causation of this condition.

FIBROUS ANCHYLOSIS OF THE METACARPO-PHALANGEAL ARTICULATION IN HUNTERS AND RIDING PONIES

This condition is frequently seen in aged hunters and occurs in both fore limbs, but more often in the off fore, and is readily recognised

when flexion or extension of the fetlock joint is attempted. It is a serious condition, even at the incipient stage, when any limited extension of the metacarpo-phalangeal articulation results, and is a frequent cause of stumbling and falls on uneven ground. In many cases, at the time of examination, lameness is not present, but is usually seen after a day's hunting, if it includes hacking some considerable distance on the road. Horses so affected frequently continue to win point-to-points, and take their turn regularly hunting, and have not been known to fall, although, as a result of the restricted movement of the fetlock joint, one would anticipate this eventuality. Slight cases of this condition are easily overlooked at the time of examination, unless the routine practice of raising either fore limb, and extension, is adopted. In a case of this condition in a thoroughbred mare, recently examined, the first phalanx could only be extended so that this portion of the limb was in a straight line with the metacarpal bone. This mare had been hunting all the season, doing three days a fortnight, and had never been known to fall. In this animal both fore limbs are affected, but she is most affected in the near fore limb, in which there is considerable thickening of the flexor tendons as a result of over-reaching in the past. Treatment, consisting of rest and counter-irritation (including point and line firing and vesication) has been adopted, but usually no improvement in the condition has resulted. Forcible extension of the joint, under an anæsthetic, followed by return to useful work, has been recorded by come observers.

PEDAL OSTITIS IN HORSES

This condition is frequently encountered in aged hunters and is the cause of chronic lameness. I am aware that so-called chronic foot lamenesses are usually referred to as disease of the navicular bone, but in the condition to which I refer, lesion on *post-mortem* is readily discernible on examination of the os pedis. Normally a notch exists between the basilar and retrossal processes of the alae of the os pedis, through which the plantar vessels pass to the external surface of the bone, sensitive laminæ, etc. In pedal ostitis, the notch, referred to above, is totally obliterated as a result of bony excrescences, which usually extend round the laminal surface of the bone.

Symptoms.—The usual symptoms are sudden and severe lameness, heat is discernible over the heels, and in cases of long standing contraction of the heels is evident. Pain is evinced on percussion with the hammer over the wings of the os pedis. The lameness does not decrease with exercise, and the foot is not usually advanced or pointed whilst at rest. The blocky, mule-like foot, which is so frequently affected with navicular disease, is not often seen affected with this disease. In some recent cases marked staining of the walls at the quarters, as a result of inflammatory extravasation, has been found. Lameness in these cases usually persists for a long period and may prove intractable. In one case I had under treatment, the subject, a brown, heavy-weight hunter, with no previous history of lameness, had been frequently noticed alternately to raise the fore feet during feeding, which symptom was attributed to excitement connected with taking food. After coming up from grass last season, and commencing walking exercise, he developed acute lameness of the off fore foot. The lameness persisted for two months, and as no improvement was evident after this period, in spite of the treatment adopted, the animal was destroyed, when well-marked evidence of this disease was found. In mild types of this disease the animal does return to soundness after varying periods.

TUBERCULOSIS IN TWO-YEAR-OLD SUFFOLK FILLY

On May 4th I was requested to examine a two-year-old Suffolk filly with the history that the animal, which was bred by the owner, had not developed as had been anticipated. She was emaciated, and on moving, it was noted that marked stiffness of the neck was present. There had at no time been any symptom suggestive of Sclerostomiasis. Cough and diarrhœa were absent. It was elicited from the owner that the mare had died when the foal was a few days old, and that the latter had been brought up on cow's milk. I informed the owner that I strongly suspected tuberculosis and suggested that I should apply the tuberculin test, as I had some tuberculin in the car; the owner, however, in view of my unfavourable prognosis, decided to have the animal slaughtered, and requested me to make a *post-mortem* examination. On *post-mortem* the pharyngeal and mesenteric glands were found to be enlarged and tuberculous. The fourth and fifth cervical vertebræ were firmly anchylosed as a result of the bony enlargement.

TETANUS IN A CAT

A cat was sent in with a history that it had been missing from home for several days, and on returning had been noticed to be suffering from extensive injury to the right forearm, as a result of having been caught in a steel fall. On examination I found the right fore limb fractured at the distal end of the radius and ulna; mortification had set in, and the limb was in a septic condition. Amputation was advised, and with this object A.C.E. was administered and the operation performed. It was noticed at the time of operation that the animal appeared rather more rigid than normal. On the day following the operation tetanus was well marked. Anti-tetanus serum was administered, but the animal succumbed four days later.

LEAD POISONING IN A PARROT

On Whit-Monday afternoon I was asked to attend an African parrot which had recently indulged in eating some oil paint and as a result of which violent sickness followed. On examination I found the bird to be suffering severely as a result of his indiscretion; the wings were dropped and the feathers dishevelled and loose. Vomition had occurred on four occasions and violent diarrhœa had supervened. As the patient had been violently sick on several occasions it was concluded that most of the unobsorbed lead oxide had been ejected, but with the object of converting any of the lead present in the stomach or bowels into non-toxic lead sulphate, magnesium sulphate in small doses was administered. On the following day the bird was prostrate owing to the violent emesis and diarrhœa continuing. Bismuth subnit. was given in solution and small doses of brandy, white of egg, and cornflour fed at intervals. For a period of three days the bird was in a precarious condition, and cause of great anxiety to its owner. On the fourth day improvement commenced, and the bird ultimately made complete recovery.

DEBILITY IN HORSES

This condition is readily relieved, if due to overwork and under feeding, by introducing into the stomach by means of the stomach tube, large doses of sodium chloride in considerable volumes of water. A little time ago for the purposes of observation I acquired an extremely emaciated light-weight hunter, which had attended a series of camps in the summer. There were no dental irregularities and no discoverable disease was present. The animal was weighed prior to treatment and once weekly during treatment. I gave this mare, by means of the stomach tube, eight ounces of sodium chloride in three gallons of water, twice daily for the first seven days, and for the next fortnight the tube was passed once daily, and the same treatment continued. The animal was fed on 7 lb. of oats, 2 lb. bran, and 5 lb. hay chaff and was racked with 5 lb. long hay. At the end of the period of treatment the normal vigour had returned, emaciation had disappeared, and the coat had acquired its old bloom. The result of this treatment so impressed the owner of the animal that I have from time to time, as routine treatment, stomach-tubed all his animals which on purchase are in a low condition, and in every case marked benefit has resulted. In these cases the animals have received saline treatment only once, but where marked benefit has not been apparent fourteen days after first treatment, this has been repeated on a second occasion.

CHLOROFORM ADMINISTRATION TO HORSES ON WHICH STRIPPING OF THE VENTRICLE HAS BEEN PERFORMED

I should be glad of the opinion of the members of this Association as to the risks attending the above precedure, as recently I had occasion to point fire for spavin a hunter on which the ventricle-stripping operation had been performed. The animal had been rigidly fasted for thirty-six hours, as I thought there might be a slight element of risk attending the administration of the anæsthetic. The tongue was withdrawn and tied in the ordinary way and the muzzle applied, and two ounces of chloroform were given. Within three minutes breathing became stertorous and the muzzle was immediately removed, and not reapplied for some minutes until the breathing had become normal. On the second application of the muzzle, anæsthesia followed normally in about four minutes, when it was considered the safe stage of anæsthesia had arrived. On using the actual cautery for firing the hock, and before I had completed the operation on the inside of the limb, the animal stopped breathing. The muzzle was immediately removed, and ammonia applied to the nostrils, when, to my intense relief, respiration recommenced, and continued normally. The operation was then completed, and no further untoward symptom noted.

TUBERCULIN TESTING OF POULTRY AND TAKING SAMPLES OF BLOOD FROM POULTRY FOR B.W.D. AND FOWL TYPHOID TESTS

As you are doubtless aware, there are existing regulations governing the importation of poultry into certain Colonies, which include the subjecting of poultry, turkeys, geese, ducks, guinea fowls and pigeons to certain tests, for specified diseases, which in the case of fowls includes tuberculosis, B.W.D., and fowl typhoid. Any veterinary surgeon nominated for this duty may at any time be called upon to carry out the tuberculin test and also collect blood for examination for bacillary white diarrhœa and fowl typhoid, and unless conversant with the necessary technique for these operations, may find himself in a quandary. I recently had cause to regret my ignorance in these matters, but fortunately I was instructed to submit blood samples to A. Leslie Sheather, D.Sc., M.R.C.V.S., of Wroxton, Chorley Wood, Herts, who has been nominated by the Ministry of Agriculture and Fisheries to carry out the necessary blood tests, and who, on application, kindly favoured me with the full details as to the application of the tuberculin test, and particulars as to the taking of the necessary blood samples, with the tubes for the collection of blood, and also a supply of avian tuberculin. I feel I cannot do better than read his instructions on these matter to you:—

Tuberculin Testing of Poultry.—The intradermal test is used and the tuberculin is injected immediately under the epidermis of one of the wattles. It must not be injected under the integument, but into it. A small syringe with a short needle is used. Exact dosage of tuberculin

is not necessary, but the dose must be recognisable as a small swelling in the skin after it has been injected. A slight swelling will develop a few hours after the injection, but this is not specific and is due to mechanical irritation of the tissues. After twenty-four hours a marked swelling of the wattle develops in infected birds. This swelling is of an œdematous nature. The persistence of the slightest swelling between the twenty-fourth and the forty-eighth hours must be considered as indicating infection with tuberculosis.

Taking Samples of Blood from Poultry for B.W.D. and Fowl Typhoid Tests.—The bird should be held breast upwards in the right arm of an assistant who, with his left hand, extends the bird's right wing. The wing vein is readily found where it crosses the "elbow joint." This vein is punctured either with a lancet-headed needle or with the point of a scalpel and the blood is collected directly into a sterile tube provided with a rubber stopper. *The tube should be not less than one-third full of blood.* The bird's identification number is then written on the label.

Discussion

Mr. W. Shipley thanked Colonel Castle for his paper which, he said, had been most interesting. Colonel Castle had referred to diabetes in the dog, but the speaker observed that he did not know what diabetes in the dog was and he did not suppose that many of them did. Quite recently he had had a lot of trouble with dogs which seemed to get worse in spite of treatment; they drank large quantities of water as in cases of gastritis, wasted and eventually died. There had been chronic nephritis and he had assumed diabetes which probably meant sugar in the urine. Cataract was mentioned, but was cataract a symptom of diabetes? As to the use of the stomach pump on horses, he would like to know the strength of saline used. The case of pleurisy in the bitch was extraordinary, the lameness being quite unaccountable. If Colonel Castle had not known this bitch had swallowed a piece of bone, would he have suspected the cause? Referring to *post-partum* insanity in cows, Mr. Shipley said there were many cases which were not correctly diagnosed. When anything happened to a cow, it was usually said to be milk fever due to a deficiency of calcium. In the case referred to by Colonel Castle, the symptoms must be brain symptoms.

With regard to pedal ostitis, there were thousands of obscure foot cases. There was nothing to guide a veterinary surgeon, yet they felt sure it was foot lameness. He was called to a horse with a wound in the heel and after a few days it broke out at the coronet. The horse was destroyed, when it was found the pedal bone was broken into several pieces. It seemed that a spike had run into the back of the heel and went right down the side of the foot, but there was no trouble until infection started.

Mr. N. F. Pollock remarked that, with regard to what Mr. Shipley had termed insanity in cows, he had seen cases in which they practically went mad for a few days and then cooled down. The skin was also affected, and he attributed it to eating various plants. He had not seen tetanus in a cat, but he had in a dog, whose owner had put a tourniquet on an injured tail and forgotten to take it off. It went remarkably stiff and within 24 hours was like a wooden dog.

Major T. G. Heatley said he never saw a case of calcium deficiency except just before and just after calving. He had seen several cases of milk fever which seemed to hang fire with inflation treatment, but had good results in these cases with intravenous injections. He thought that many of the cases of milk fever which did not recover were due to traumatic pericarditis, the animal having swallowed some foreign body which pierced the diaphragm, lungs and heart at the straining during parturition. In the case cited of the bitch, the bone swallowed set up a septic condition in the œsophagus, causing pleurisy. He thanked Colonel Castle for his extremely interesting paper.

Mr. H. P. Standley, senr., said every case that Colonel Castle had quoted was of great interest to all practitioners. He would be glad to watch his treatment for sterility in cows. Only in some cases did they derive any good from the old treatment of iodine and washing out the uterus. Jugular pulse, in his opinion, did not matter where a horse showed no signs of fatigue or where the heart gave no abnormal sound. It was most vital to examine the heart.

Whether they could diagnose heart disease in the lower animals was a question. They should inform an owner if his horse had an intermittent heart beat, but there were cases in which it did not seem to make much difference. Enlargement round a hunter's fetlock was about the worst form of lameness they could have. As to diabetes in the dog, if there was sugar in the urine, then it was diabetes; when albumen was found it indicated nephritis and when that occurred dogs, as a rule, did not recover.

Mr. J. W. Beaumont said he was glad the jugular pulse point was settled. He often found a definite pulse in the lower third of the jugular, but took no notice of it. Colonel Castle's cases of insanity in cows were mild. He had seen a lot of it in various stages. In the majority of cases the cow was dead before they reached it; in other cases the cows went into convulsions as soon as any movement took place in the box. He had tried drenching, but the animals at once went into convulsions, so he had given that up. Some people called that sort of thing meningitis, but he was of opinion that it was toxæmia and that the primary cause of the trouble was in the stomach.

The Reply

Colonel Castle, in replying, acknowledged the reception given his paper. He said that in the three cases of diabetes, sugar, in pathological quantities, was found in the urine. There were also lassitude and loss of condition. Double cataract was often associated with diabetes. He was pleased to hear two gentlemen say that a jugular pulse, when restricted to the lower third of the neck, was not an unsoundness. The dose of saline for the treatment of debility in horses was eight ounces in three to four gallons of water. It excited thirst which assisted the animal. In cases where a foreign body was suspected and the veterinary surgeon could not see anything, a skiagraph did help to reveal its presence. He remembered a Pekinese which he was told had swallowed a needle and cotton. The cotton had been recovered but not the needle. A skiagraph negatived the presence of the needle and the dog did well, so he assumed that no foreign body was present.

DEATHS AMONGST RACING GREYHOUNDS AT BLACKPOOL

Mr. Tom Walker, m.r.c.v.s., has furnished us with some details regarding the deaths amongst racing greyhounds on the Blackpool track, on August 16th, 1932—a matter which received considerable publicity in the lay Press.

Two dogs died, one whilst being taken from the training kennels to the racing kennels and the other during a race.

Mr. Walker, who held a *post-mortem* examination together with Mr. J. N. J. Hagan, m.r.c.v.s., of Kirkham, formed the opinion that death was due to certain dietetic changes which had recently been made, aggravated by the excessive heat.

Material was sent to Dr. Clough, of the Royal Veterinary College, Camden Town, for chemical analysis, but no poisons were detected.

At no time, apparently, was there any suspicion of foul play.

THE KING AT SHEEP DOG TRIALS

A Command Display

The King and Queen last week attended sheep dog trials, which were held by Royal Command on the golf course in the grounds of Balmoral Castle. Those present included the Duke and Duchess of York with Princess Elizabeth and Princess Margaret, Prince and Princess Arthur of Connaught, King George of Greece, Mr. Ramsay MacDonald, and Mr. J. H. Thomas.

Heavy rain had fallen on Upper Deeside from early morning, but the weather cleared shortly before the trials began. Four well-known Scottish sheep dog owners took part. They were: J. M. Wilson, of Moffat; A. Millar, of Newmilns; K. MacAstkill, of Keith; and J. Hendry, of Inverurie. Mr. Wilson's five-year-old dog Craig, which is champion Scottish sheep dog, gave a remarkable display. Afterwards the four owners were brought before the King and each presented with a silver matchbox bearing the Royal monogram; Mr. Wilson also received a silver watch from the King.

* * * * *

CHIEF MEDICAL OFFICER FOR SCOTLAND

The Secretary of State for Scotland has appointed Dr. James Law Brownlie to be Chief Medical Officer of the Department of Health for Scotland in succession to the late Dr. John Parlane Kinloch.

* * * * *

THE RAT-CATCHER'S BILL

The wife of a Greenwich solicitor saw a rat in her garden. She got into touch with a rat-catcher, who duly arrived and carried out his work of extermination. When his bill arrived it read:—

	£	s.	d.
Rat-catcher, 5s. per hour, 5 hours	1	5	0
Assistant, 3s. per hour, 5 hours...		15	0
Poison, 2 quarts at 8s. 9d.		17	6
Destroying rats (six) and nests— rats, 7s. 6d. a carcass	2	8	0
Total	£5	5	6

Abstracts

[The Influence of Diet on Carbon Tetrachloride Intoxication in Dogs. Cutler, Jessie T. *The Journal of Pharmacology and Experimental Therapeutics.* Vol xlv. June, 1932. No. 2.]

The influence of diet upon the intoxication and degree of liver injury produced by phosphorus, chloroform and carbon tetrachloride has received considerable attention. Several criteria for estimating the influence of diet have been used by different investigators. Some have based their comparisons solely upon the comparative amount of liver destruction produced by a given dose of the drug in animals on various diets, while others have compared the severity of the symptoms, the size of the lethal doses, or mortality statistics. In the present study the influence of various diets on carbon tetrachloride intoxication has been studied, using all of these criteria.

Since its introduction as an anthelmintic by Hall in 1921, carbon tetrachloride has been fairly extensively studied. A number of deaths followed its widespread use, and led to a study of the conditions affecting its toxicity. It has been shown by a number of investigators to produce fatty infiltration and central necrosis of the liver quite similar to that produced by chloroform.

These experiments were planned to show the effect of several different diets, both upon the amount of liver injury and upon the severity of the intoxication produced by carbon tetrachloride. The results are not wholly in accord with those of other observers, inasmuch as we have not been able to demonstrate any consistent influence of diet upon the degree of liver injury. We have, however, been able to influence profoundly the severity of the intoxication. Studies of blood chemistry of the intoxicated animals suggest an explanation for the symptomatic differences.

The earliest symptoms of carbon tetrachloride intoxication are usually those of gastro-intestinal disturbance and appear 12-20 hours after the dose. Many of the animals refuse to eat. Others eat and soon vomit. A little later, especially if a meal of meat has been eaten and retained, twitching of the lips and paws develops. At this period fibrillary tremors can be felt in most of the skeletal muscles. After 6-12 hours violent general convulsions may develop, following which the animals grow progressively weaker. Death usually follows a period of profound depression or coma. Some never develop the convulsive symptoms, but after a brief period of nervous hyper-excitability pass rapidly into a state of depression. The later stages of the intoxication are accompanied by a foul, bloody diarrhœa, and often

by the vomiting of brown "coffee ground" material. There is a tendency to severe gastro-intestinal hæmorrhage.

The intoxication is accompanied by a number of significant changes in the chemical constituents of the blood. A few hours after administration there is found an increase in the guanidine content. That the whole intoxication is largely or wholly secondary to this guanidinæmia is indicated by the fact that an entirely similar picture, both as to symptoms and blood findings, can be produced by the subcutaneous administration of guanidine hydrochloride.

Secondary to the guanidine increase there is a severe disturbance of carbohydrate metabolism. The blood sugar, after a brief preliminary rise, falls until it reaches a very low level. Hypoglycæmia appears to be the immediate cause of death in most of the animals. Coincident with the fall in blood sugar there is a rise in lactic acid. The dogs used in these experiments were put on special diets and carefully fed for varying periods:—

(*a*) lean meat without bones, a diet very low both in calcium and carbohydrate;

(*b*) lean meat and calcium salts (a heaping teaspoonful of a mixture of calcium carbonate and calcium lactate daily);

(*c*) bread and milk, a diet rich both in calcium and carbohydrate;

(*d*) lean meat and dextrin, low in calcium but rich in carbohydrate;

(*e*) beef fat and cream, a diet very high in fat.

We have not been able to demonstrate any consistent differences in the amount of liver damage produced by carbon tetrachloride in the dogs on different diets. In every group the amount of destruction, judged by an estimation of the percentage of liver tissue necrosed, varied from moderate to extremely severe, with averages which were not significantly different.

On the other hand, the severity of the symptoms and the number of deaths secondary to the liver damage can be profoundly affected by the diet.

Of 131 dogs fed on diet (*a*) 98 died following the administration of 4 c.cs. of carbon tetrachloride per kilogramme. Of the 33 which survived, 15 were very ill for a time, while only 18 remained without symptoms. In this group the percentage of necrosed tissues in the liver ranged from 25-95.

Ninety-eight dogs on diet (*b*) were given the same dose of the drug. Of these, only 18 died with a typical intoxication, while 75 showed no symptoms from the drug. The degree of liver necrosis in this group varied from 35-95 per cent.

Fourteen dogs were fed on diet (*c*). Eleven showed no symptoms, one was slightly ill, and two died. The amount of liver destruction ranged from 30-90 per cent.

Of the 18 dogs fed on (*d*) seven showed no symptoms, seven died, two were ill but recovered, and two were ill and killed 48 hours after the dose for the examination of tissues. Liver necrosis varied from 10-90 per cent.

Eight dogs were fed on (*e*); of these five showed no symptoms, two died and one was very ill. Liver necrosis 40-70 per cent.

The significant chemical changes in the blood of the poisoned animals are an increase in guanidine and a severe and often fatal hypoglycæmia. It is believed that the symptoms of intoxication and the hypoglycæmia are secondary to the increase in guanidine. The antagonism between guanidine and calcium has been repeatedly demonstrated.

These experiments indicate that none of the above diets will protect the liver tissue from destruction by carbon tetrachloride. In order to protect against the intoxication resulting from the drug, a diet should (*a*) not tend to increase the guanidine as meat has been shown to do; (*b*) be rich in calcium to combat guanidine; and (*c*) be rich in carbohydrate to relieve hypoglycæmia if it develops.

Diets which fulfil these requirements have given us a high resistance to carbon tetrachloride with the least symptoms of intoxication and the lowest death-rate.

J. G. W.

* * * * *

[The Rhino-laryngoscope. Lloyd, Major Glynn, *Jour. Royal Army Veterinary Corps.* Vol 3. No. 4. Aug., 1932. pp. 178-182. (2 figs.)]

On the occasion of the April meeting of the Central Veterinary Society, Major Glynn Lloyd, in his contribution to the discussion on Major Hicks' paper "The Examination of the Horse as to Soundness" (*V.R.*, 12, 23, pp. 629-638) justly referred to the use of the rhino-laryngoscope as exemplifying the type of advancement in methods of diagnosis to which the veterinarian of the present day should direct his attention. It was a reference which stimulated both interest and approval at the time, and Major Glynn Lloyd's present exposition of the construction, method of use and results to be looked for from the employment of the instrument should of itself secure wide perusal amongst the profession of the current issue of the *R.A.V.C. Journal.*

A detailed description of the instrument—which is essentially a long double metal tube, the space between being filled with insulating material, with eye-piece at one and electric bulb *plus* reflecting apparatus at the other extremity,

and a rotatory attachment—is followed by an account of the manner in which it is passed up the right nostril *via* the posterior meatus into the cavity of the pharynx. Efficient restraint of the patient is of course supremely important, and is adequately dealt with. The pharynx having been gained, a protective sheath ingeniously devised by the author to cap the instrument (thus preventing the dulling of the window by mucus during its passage) is drawn back, so clearing the lamp and mirror, and manipulation of the rhino-laryngoscope brings the whole of the larynx into view.

Diagrammatic figures illustrate two of the views thus obtained, the first being that of the symmetrical normal larynx and the second a view of a diseased larynx consequent upon paralysis of the left recurrent laryngeal nerve, in which the whole aspect of the organ is asymmetrical. The textual account of the conditions illustrated continues with descriptions of the pictures revealed following the stripping of the ventricles and in broken wind.

Apart from examining the larynx of the horse, any abnormal condition of the pharynx, posterior nares, or nasal cavity can be observed, and Major Glynn Lloyd gives a vivid illustration of its further possibilities in its employment—in this instance on the dead subject—with a view to assisting in the operation for ovariotomy. "The assistant, lying alongside the operator could, by looking up the instrument" (introduced into the peritoneal cavity through the opening made in the vaginal wall) "inform the operator whether he was grasping the ovary, and could watch the chain of the écraseur being passed over the ovary and inform the operator if a loop of bowel or omentum were inadvertently included in the chain. The subsequent removal of the ovary could be watched in every detail by the assistant."

As one can readily conceive an extension of such adaptability to the examination of other conditions, not confined to the horse, beyond the range indicated by the name of this instrument, and in which the presence of a squad of assistants is not imperative, it may yet prove of value to the general practitioner to have Major Glynn Lloyd's assurance that with constant practice the rhino-laryngoscope becomes easy to manipulate.

W. B.

* * * * *

[New Research on the Control of Anthrax. Hruska, K. *Prag. Archiv. f. Tiermed,* 1932. Vol. 12. No. 5.]

This paper relates the progress of anthrax control during the last ten years in Czechoslovakia and much concerns the author's own experiences in this matter.

Many variations in vaccination methods have been tried out, including the Pasteur method and its modifications, Besredka's intracutaneous method, Sobernheim's method, etc., but none of these was found to be free from some important disadvantage, either in the matter of danger to the inoculated animal or to the limited duration of time during which protection against infection was established.

A noteworthy contribution to the problem of immunisation against anthrax appears to have been made by the discovery that a good immunity can be produced by inoculating animals with a mixture of living bacteria and a glucoside—saponin and digitonin are referred to in this respect. In preliminary experiments 113 cattle have been treated in this way in Czechoslovakia and results are said to be promising. One inoculation only is required, the immunity is established in 8-10 days and there is no danger of anthrax being given by the inoculation. The duration of immunity is not yet known.

The author states that the Italian Mazzucchi "Carbozoo" vaccination method is based on a similar theory and has been employed on thousands of animals in Italy with claims for high efficiency.

J. E.

* * * * *

[On an acute Disease of the Pancreas in a Dog. Schramek, J. *Prager Archiv. f. Tiermed,* 1932. Vol. 12. No. 5.]

A two-year-old dog which had previously enjoyed good health except for a few days of indisposition after being run over when one year old, became ill rather suddenly and after five days' illness, in which abdominal pain and severe vomiting attacks were the outstanding features, death occurred.

Post-mortem examination revealed an apple-sized swelling in the pancreas with a general interstitial œdema of the organ and multiple yellow or red spots showing on the surface. The omentum showed several areas of fat necrosis. The pancreatic duct to the duodenum was not occluded.

No other organ showed any sign of disease.

The histological picture of the pancreas is described in detail, the morbid process being found to be a widespread necrosis of the gandular tissue with the peculiarity that the cell islets of Langerhans did not participate in the necrosis.

The pathology of this condition is discussed at length with reference to a similar condition in man. Pathologists interested should consult the original.

J. E.

Review

[Atlas of the Anatomy of the Domestic Animals. Ames, Iowa: College Book Store, Iowa State College. 1932.]

This atlas, dedicated to the advancement of anatomical knowledge, has been made from dissections prepared by the members of the staff of the Department of Veterinary Anatomy, Iowa State College, during the years 1927-32. It contains five plates illustrating the anatomy of the horse, two of the cow, one of the pig, two of the dog, and two of the fowl. Obviously the eighteen figures of the twelve plates cannot illustrate more than part of the anatomy of the domestic animals, but nevertheless should be useful up to their limitations.

The technical production of the figures is excellent. The price is not indicated.

Report

STRAITS SETTLEMENTS

Annual Report of the Veterinary Department for the Year 1931

During the year under review the staff of the Veterinary Department consisted of two European Veterinary Officers, ten non-European Assistant Veterinary Surgeons and Inspectors, four clerks and 39 subordinates, distributed throughout the three settlements of the Colony. Central control and administration were effected from the Singapore headquarters by the Principal Veterinary Officer, Mr. F. J. Sheedy, who also functioned as such in the Federated Malay States and as Veterinary Adviser to the Unfederated States.

Early in the year a conference of the Veterinary Officers of the Straits Settlements and Federated Malay States was held in Penang, and various matters, such as quarantine measures, rabies, rinderpest, haemorrhagic septicæmia, animal husbandry and recruitment, were discussed. This conference afforded the Principal Veterinary Officer an opportunity of meeting all his senior officers together for the first time, and of obtaining first-hand evidence of the particular problems dealt with by each in his own area, and their influence on the operations conducted elsewhere.

Veterinary activities were mainly confined to the application of measures for excluding animal disease from outside sources and controlling such outbreaks as arose within the territory. An animal census shows that there are approximately eighteen thousand cattle, nineteen thousand buffaloes, twenty-three thousand sheep and goats, one-hundred-and-six thousand pigs, twenty-four thousand dogs and about five hundred horses in the areas under supervision. But the difficulties of obtaining accurate figures are considerable, especially in the cases of small animals which are commonly kept in dwelling houses and whose numbers are not always disclosed by suspicious owners. The cost of this administration, regarded as an insurance premium, is distinctly moderate, amounting to a fraction of over 1 per cent. on the value of the animals.

With the exception of continuous outbreaks of rabies in Penang and Province Wellesley, the animal health throughout the Colony was satisfactory. As the Department effort is primarily directed against the prophylaxis rather than the treatment of disease, this freedom from disease must be regarded as evidence of the success of these efforts. The only outbreak of rinderpest recorded was detected in slaughter cattle from Rangoon and was promptly stamped out. Foot-and-mouth disease was detected in the stock-yards of Singapore but was "of the usual mild type and responsible for no mortality and little loss in condition in affected animals." Nine cases of swine fever were detected, but as sick animals are "not infrequently brought into the dwelling houses by solicitous owners or by those who prefer to resort to secrecy than apply for skilled advice and treatment," the actual numbers reported cannot be regarded as complete. Rabies was combatted by (*a*) the prohibition of the entry of dogs into or exit from proclaimed areas; (*b*) a muzzling order or compulsory restraint of all dogs within specified areas; (*c*) destruction of all stray and unlicensed dogs and those found at large in prohibited areas. Figures collected indicated, however, that the number of unlicensed dogs destroyed was nearly fourteen thousand, whereas the total number of dogs licensed was only seven thousand. "Much of the trouble is doubtless attributable to casualness which will continue until the occurrence of one or more fatal cases of hydrophobia emphasises the necessity for stricter control of dogs." The last case of rabies recorded in Singapore dates back to December, 1907: "Since then the Settlement has enjoyed an immunity which, in the East, can only be described as amazing."

It is emphasised that the Colony is not a stock-raising country: "It never has been and never will be one." Meat and dairy products are nearly all imported, but it is considered possible that by growing food the Colony may become more self-supporting, especially in respect of the latter. Beyond the sheep imported from India and Australia for mutton there are practically none in the country. As a rule, goat flesh is preferred to mutton by all Asiatic people.

N.V.M.A. Divisional Report

EASTERN COUNTIES V.M.A.*

SUMMER MEETING AT GREAT YARMOUTH

The Summer Meeting of this Division was held at the Royal Masonic Assembly Rooms, Great Yarmouth, on Friday, July 15th.

The President, G. T. Matthews, Esq., was in the chair, and the following members were also present: W. Shipley, Colonel A. F. Castle, T. G. Heatley, W. Waters, H. P. Standley, senr., B. Claxton, V. Boyle, W. F. Loveless, W. H. Wortley, A. J. Beeson, W. H. Dennett, J. F. Thurston, P. Welch, S. Bennett, W. Turtill, W. Howes, J. M. Currie, R. Lovell, N. F. Pollock, J. W. Beaumont and H. P. Standley, junr. (Hon. Secretary).

Luncheon was served to a company of over 30 members and their ladies. After lunch the annual Bowls Tournament for the Shipley Cup took place, and which, after a keen contest, was won by Captain V. Boyle, the runner-up being Mr. J. W. Beaumont.

A collection on behalf of the Victoria Veterinary Benevolent Fund, in connection with this Cup, amounted to three guineas. After the Bowls Tournament, members and their friends were entertained to tea by the President and Mrs. Matthews. Mr. H. P. Standley, senr., proposed a hearty vote of thanks to the President and Mrs. Matthews for entertaining the company to tea and said it was some 20 years since the Society met at Yarmouth: it was quite like old times. Major T. G. Heatley seconded in a suitable manner.

The business meeting followed after tea. The minutes of the last meeting, as published in the *Veterinary Record*, were taken as read and were signed. Letters regretting their inability to attend were received from Messrs. H. Buckingham, D. Blyth, A. P. Burgon, senr., A. Burgon, junr., J. Buckingham, W. J. Browning, M. Bray, Professor J. B. Buxton, F. L. Gooch, Professor Hobday, W. F. Jack, P. R. Turner, R. C. Tayler and Colonel W. A. Wood.

* Received for publication August 4th.

The President and Mr. H. P. Standley were nominated to serve on the Council of the N.V.M.A.

It was decided to hold the next meeting at Bury St. Edmunds on October 7th, 1932.

Lieut.-Colonel F. Castle, F.R.C.V.S., then read a paper: "A few brief Notes on Cases met with in Every-day Practice." [Colonel Castle's paper, and the ensuing discussion, are reproduced in our "Clinical Communications" Section this week.—Ed., *V.R.*] A vote of thanks to Colonel Castle, proposed by the President and seconded by Mr. H. P. Standley, senr., was carried with applause.

Mr. Shipley exhibited the brain of a horse showing a well-marked tumour. This horse, owing to difficulty in movement, was first thought to be suffering from laminitis. The horse improved with exercise, but on being put to work showed marked brain symptoms and was destroyed. On *post-mortem* examination, the tumour exhibited was found. Mr. Shipley also exhibited a greyhound's eye which had been pierced by a thorn nearly an inch long.

The meeting concluded with a hearty vote of thanks to the President for his conduct in the chair.

H. P. Standley, junr., *Hon. Secretary.*

A table shows that cattle to the value of about one million dollars, milk to the value of nine million dollars, ghee valued at one million dollars, and eggs at nearly 750,000 dollars were imported.

Mr. Sheedy terminates his interesting report by pointing out the need for veterinary research, and by expressing his appreciation of the loyal and valued co-operation of his staff.

L. E. W. B.

THE AMERICAN COLLEGIATE ROLL

"Of the 933 freshman veterinary students registered for the five years 1923-4 to 1927-8, inclusive, approximately 83 per cent. were graduated at the end of four years (classes of 1927 to 1931, inclusive)," says the *Journal of the American Veterinary Medical Association.* "In the fall of 1928 there were 324 freshmen registered in the thirteen veterinary colleges in the United States and Canada. This represented an increase of about one-third over 1927, the greatest increase for some time. Of these 324 matriculants, only 247 were graduated this year. The percentage is 75·6, the lowest in six years. Is the veterinary curriculum becoming more strenuous, or are our veterinary colleges becoming more exacting?

"Based on this year's showing, only three out of four veterinary students can expect to be graduated on time. If the same rate of mortality holds next year, we may expect about 263 graduates for the year 1933. As a matter of fact, the number will probably be less, as there were only 270 junior students enrolled the past year. However, this number may be augmented by a few who failed to finish on schedule this year. In any event we are still several years away from the time when the number of graduates will equal the theoretical requirements for the country."

* * * * *

The livestock census taken in Northern Ireland on June 1st shows an increase in cattle, but decreases in sheep and pigs.

* * * * *

Clydesdale stallions travelling in England are stated to have had heavier seasons this year than they have had for some time. Horse breeding appears to be recovering some of its lost ground.

THE BRITISH ASSOCIATION

We reproduce below summaries of discussions, presenting features of special interest to our readers, which took place at the meetings of the British Association for the Advancement of Science, held at York.

BRITISH SHEEP FARMING

Suggestion of More Intensive System

In his Presidential address to the Section of Agriculture, Dr. R. G. White, Professor of Agriculture at Bangor, dealt with sheep farming in these islands, a pursuit which he described as a distinctive feature of British agriculture.

One-third of all the world's sheep were in the British Empire, producing half the world's wool and probably about the same proportion of mutton and lamb. In relation to total land area the sheep population of Great Britain was surpassed only by that of New Zealand, and even in actual numbers Great Britain was eighth on the list, and except for New Zealand was surpassed only by countries many times its size. None the less, an exaggerated view must not be taken of their importance. In 1925 mutton and lamb brought to the British farmer rather less income than did vegetables, flowers, and fruit. Possibly by now even poultry might be more important financially than sheep.

Our sheep could now be divided into three large groups—(1) mountain and hill flocks; (2) flocks kept largely or mainly on arable land where folding was the characteristic feature; and (3) lowland grass flocks kept primarily for the production of fat lambs.

We had almost reached, said Dr. White, the state of affairs in which hill and mountain flocks were maintained primarily to produce breeding ewes of a hardy, heavy-milking character; a relatively few arable sheep had as their chief object the breeding of rams of excellent mutton qualities mainly for crossing purposes; the draft ewes from the hills and the rams from the arable flocks met in the lowland pastures to produce lambs for sale almost entirely in the summer and autumn months. The great concentration on production in summer was one of the dangerous features of the present situation. It made our supply over the year very uneven, and there could be no doubt that this was one of the reasons for a decrease in the proportion of home-fed meat.

We were bound to admit that grass sheep under ordinary management gave only a low return of food; on the other hand, the farmer could make out a strong case for the sheep. We had large areas of hill and mountain which, under present conditions, could only be economically utilised for sheep, and they carried a very large proportion of our sheep. Our mountain flocks could only be maintained if they had an outlet for the draft ewes and store lambs, which largely constituted their saleable product. Sheep managed so as to meet modern market demands fitted in extremely well with grass production. So many fat lambs were now sold in summer that the annual cycle of the sheep population very closely resembled that of production from grass land. Numbers were at the minimum in winter and the requirements of the flock were at their maximum in May and June. Even the autumn flush of grass was met by the influx of sheep from hill grazings.

With regard to the future, the President made a number of suggestions. The weakest point at present, he said, was the low return per unit of the flock. It might be possible to keep sheep which would give two crops of lambs a year. At present there was a huge supply of lambs on the market from June to October and very few from January to May. By selection and proper management two crops could be obtained fairly regularly. Also the prolificacy of the ewes could be increased; at present the average was just over one per ewe. It was possible also that a return might be made to the old custom of milking ewes for cheese production. He doubted if it would continue to be advantageous to look to the wool crop in this country as worth developing. Much also might be done by management of sheep on a more intensive system by an improved method of "housing and cotting," preventing the dissipation of energy by the loss of heat, and also by supplying supplementary foods.

. . . . .

PROBLEMS OF BIOLOGY

Lord Rothschild and Animal Life

Lord Rothschild, F.R.S., president of the Section of Zoology, in his address from the chair, said it sometimes appeared to the uninitiated as if there were antagonism between opposite lines of attack on the problems of biology, while in reality all the different lines supported each other.

Variability, he said, is an essential character of everything alive. The concept of the constant species of former days is replaced by the concept of the flexible species, and the saying that like breeds like requires modifying into the statement that a population breeds a population with the same extent of variability. If like breeds like were being taken literally, we should have to alter it into like breeds unlike. For, strictly speaking, individuals are never alike whatever their relationship to each other.

As in the study of sub-species the systematist must enter upon geography, so in the search for the past connections between genera and families his research becomes linked with the past history of the earth and sometimes throws light on this history. If he can prove that two genera now widely separated geographically are really of common stock, then there must have been a means of communication in former times which is now absent.

One of the most remarkable lacunæ in the butterfly fauna of Africa south of the Sahara is the total absence of swallowtails which feed as larvæ on *Aristolochia*. The species are numerous both in America, especially in the tropics, and in the Oriental region, but not a single one has reached Tropical and South Africa, though food plants occur, only one species of Ceylonese affinity being found on Madagascar. In face of this evidence it is impossible to believe that after the appearance on earth of the butterflies there ever existed a bridge between Africa and South America.

In the vast majority of species the geographical differences were quantitatively small and frequently so concealed (or even inside the body) as to exclude the idea that a process of selection through enemies takes place in such cases. This elimination of one factor in their evolution, however, did not answer the question how these small differences have arisen and become hereditary. A new sub-species being the old plus the surviving and accumulating effect of mass and energy of the environment, perhaps observations of another kind gave a hint. In an instance here and there it has been found that the larvæ of a Lepidopteron, usually monophagous on a definite plant, through force of

circumstances or accidentally feed upon another species of plant, and that then the offspring of this brood will rather die than take to the normal food-plant of the grandparents. Did it not look as if here a habit had become fixed in one generation?

If we looked upon the component parts of an insect specimen as if each part were an individual and applied the above observation, it was quite conceivable that in a new environment one or the other factor affecting the development of the growing body would stimulate this or that individual organ, or group of cells, or retard its development, and when an acceleration or a retardation had taken place in one generation, a predisposition, a habit, was acquired by that organ which would persist, like the habit of eating the strange plant. The crested lark, which was common on the south shores of the Channel, but never crossed the twenty odd miles of water, except by accident (about half a dozen specimens being known from England), taught us that habit is a pertinacious factor in life.

. . . . .

PARASITIC WORMS

Economic Importance of Helminthology

In the Section of Zoology, under the Presidency of Lord Rothschild, Professor R. T. Leiper, F.R.S., of the London School of Hygiene and Tropical Medicine, said that helminthology began by being a branch of medicine and concerned two groups of worm-like creatures, the round worms and the flat worms, with no zoological relationships, but linked practically because of their importance as internal parasites of animals and plants.

There were three ways by which the presence of these parasites in the body of a living man or animal could now be detected and the worms identified. The eggs could be found in the fæces and identified by the sculpturing on their shells; the larvæ themselves could be detected in a drop of blood taken from the ear; and the changes produced in the blood could be detected by serological tests. Infection was probably never through dry dust or air, but always by contaminated water, contaminated food, or directly by eggs or larvæ getting entrance.

Although, thanks to experimental work on the life-history and modes of infection, the avenues of infection, and therefore the means of protection, were now well known in most cases, they had often been very difficult to detect. There were, for example, cases in the East of infection by the larvæ of a worm which naturally lived in the frog. After prolonged search it was found almost by accident that in cases of ophthalmia the natives had been accustomed to apply the bodies of split frogs as cooling poultices to the eye and that the infection had thus been direct.

Economic helminthology, said Professor Leiper, was almost as important to the Empire as economic entomology, and as soon as financial conditions were less stringent he hoped to see it taken up on a large scale by Governments and Universities.

Dr. T. W. M. Cameron, who, as already announced in the *Veterinary Record*, is shortly to take up the post of Director of the new Institute of Animal Parasitology at McGill University, followed with an account drawn up by himself of the importance of helminthology to veterinary medicine, and to fisheries, which he gave on behalf of Dr. T. Southwell.

PRESERVATION OF WILD LIFE

Sir David Prain's presidential address on "The Conservation of Wild Life" to the Conference of Delegates of Corresponding Societies was read, in his absence through illness, by Dr. Rendle.

The time had passed, Sir David wrote, for intellectual or emotional appeals. The members of the Corresponding Societies knew the value of conservation and were already ardently in favour of it. The point was how could they assist in preserving the amenities of their own area and particularly the fauna and flora.

A great deal could be done for preservation under Acts of Parliament and county bye-laws. Sir David discussed many of the steps that could be taken, but pointed out that in the end it generally came to the acquisition of particular pieces of land. Sometimes local efforts were apt to be swayed by local traditions and prejudices, and it was of importance that before making an effort to acquire land, local societies should take advice with regard to amenities from the Society for the Preservation of Rural England, the Footpaths and Commons Preservation Society, or similar bodies, and with regard to sanctuaries for animals and plants, from the Linnean, Entomological, or Zoological Societies. Very few local societies had statutory powers to hold land and dedicate it to the public; but the National Trust and the Society for the Promotion of Nature Reserves had such powers, and were willing to exercise them, provided that the areas were suitable and that provision for their maintenance was made. It was to be remembered, moreover, that when land was vested in the National Trust because of its amenities, it must remain open to the public. On the other hand, the essence of a sanctuary or breeding reserve was that at least for an important part of the year it should be closed to the public.

. . . . .

ANCESTRY OF MAN AND APES

Dr. Thornton Carter, in the course of a discussion between the zoologists and anthropologists on the primates and early man, explained that there are two types of structure of the enamel of the teeth in fossil lemurs in the Eocene deposits of Europe and North America. One of these two types is found in all the lemurs of Madagascar, the Old World monkeys, and the great apes and man; the other type is found in all the lemurs now living in Asia and Africa, in Tarsius, and in the New World monkeys.

Dr. Tate Regan, director of the Natural History Museum, attached fundamental importance to Dr. Carter's discoveries and held that lemurs arose before the Eocene, when all the continents except Australia were joined. Afterwards those with straight enamel prisms gave rise to the Old World monkeys in Africa and those with wavy edges to the Tarsoids in the Old World and the American monkeys in the New World. Further, he held that the gibbons were much closer to the primitive human stock than the other apes, and that of the latter the chimpanzee was the most primitive and most like man.

(To be continued.)

In the list of sixty highest milk yields in Scotland of cows producing another calf within thirteen months there are thirty-six Ayrshires, sixteen British Friesians, five Jerseys, and three cross cows.

Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

* * * * *

DIARY OF EVENTS

Sept. 12th.—Meeting of the Editorial Committee, N.V.M.A., at 2, Verulam Buildings, Gray's Inn, W.C.1, at 4.30 p.m.

Oct. 1st.—New Five Years' Course, Membership R.C.V.S., comes into operation.

Oct. 3rd.—N.V.M.A. Committee Meetings, 2, Verulam Buildings, Gray's Inn, W.C.1.

Oct. 4th.—N.V.M.A. Committee Meetings, 2, Verulam Buildings, Gray's Inn, W.C.1.
N.V.M.A. Council Meeting, 10, Red Lion Square, W.C.1.

Oct. 5th.—R.C.V.S. Committee Meetings.

Oct. 6th.—R.C.V.S. Committee Meetings.

Oct. 7th.—R.C.V.S. Committee and Council Meetings.

Nov. 1st.—All changes of address for insertion in the 1933 Register to be reported to the Registrar, R.C.V.S.

* * * * *

PERSONAL

N.V.M.A. Congress.—We regret that the name of Mr. J. Willett was inadvertently omitted from the lists given in last week's *Record* of those who sent apologies for absence from the Annual General, Council and other meetings held at Folkestone.

. . . . .

The Durban Appointment.—In connection with the reference, in our issue of August 6th, to the appointment of Mr. W. A. Dykins, M.R.C.V.S., as Director of the Municipal Abattoir, Durban, Natal (in succession to Major W. G. Barnes, M.R.C.V.S., M.C., on retirement), the following features of Mr. Dykins' career are of interest:—

Educated at Ruthin, North Wales, from where he proceeded to the Liverpool University to embark on his professional career, Mr. Dykins qualified in 1910, and the same year, on the recommendation of the late Professor W. Owen Williams, he was appointed Government Veterinary Officer in the Union Department of Agriculture. Mr. Dykins has been stationed in many centres in South Africa, and has principally been engaged on East Coast fever work. During the Great War, he saw active service in German South-West Africa, being veterinary officer to the Eastern Force. He also was attached to the Seventh South African Horse and the Third South African Field Artillery during the German East African campaign. He was mentioned in dispatches, and later promoted to the rank of major.

In 1931 he was elected a member of the Natal Veterinary Board, which body controls the conduct of the veterinary profession in Natal.

In addition to the abattoir appointment, Mr. Dykins will have charge of the Transport Section, including the care of 400 horses and mules, and he will be further called upon to direct the work in connection with the control of bovine tuberculosis in licensed dairy herds, involving the systematic inspections of cowsheds and dairies, and the routine clinical examination of all cows in licensed dairies, etc.

. . . . .

Colonial Service Appointment.—Mr. O. Dixon, *M.C.*, M.R.C.V.S., Senior Veterinary Officer, Kenya, has been appointed Assistant Chief Veterinary Officer of that Colony.

. . . . .

Examination Successes.—Mr. E. J. Pullinger, B.V.SC. (Pretoria), M.R.C.V.S., of the Research Institute in Animal Pathology, Royal Veterinary College, after completing the necessary course of instruction at the London School of Hygiene and Tropical Medicine, has passed the examination for the Academic Diploma in Bacteriology (Dip. Bact.) of the University of London. Mr. P. S. Watts, M.R.C.V.S., who holds a Ministry of Agricultural scholarship, also took this course and passed the examination.

. . . . .

Judging at Limerick.—Many members of our profession win golden opinions for their knowledgable work in the judges' enclosure, and it is interesting to learn that Lieut.-Colonel A. G. Doherty was officiating in that capacity at the Limerick Horse Show on the 24th and 25th of last month, this being the most important show in the South of Ireland after Dublin.

* * * * *

FOOT-AND-MOUTH DISEASE IN DEVON

The Ministry of Agriculture stated on Monday last that the existence of foot-and-mouth disease had been confirmed on premises near Malborough, Devon. The area subject to restrictions on the movement of animals is situated wholly in the county of Devon.

A further outbreak of foot-and-mouth disease in Devon was notified later at a farm at Salcombe, 20 head of cattle and one pig being affected.

Efforts are being made to trace a number of sheep which were sold at the South Brent (Devon) annual sale a short time ago. It has been found that the sheep came from an area which is believed to be infected with foot-and-mouth disease.

. . . . .

According to a report issued on Tuesday by the Ministry of Agriculture, during 1931 there were 97 outbreaks of foot-and-mouth disease in Great Britain. Of these 65 were due to infection introduced in June by a consignment of cattle imported from County Down, Northern Ireland, *via* Belfast. In connection with the series of outbreaks 7,310 animals were slaughtered by the Ministry, and the compensation paid amounted to £70,554. Of 5,450 animals which were given serum treatment during the year only two developed the disease. It is pointed out, however, that serum, while usually affording protection against infection for about 10 days, is not curative, and its use in field outbreaks is still only in the experimental stage.

* * * * *

ARMY VETERINARY SERVICE

London Gazette—War Office—Regular Army

Sept 2nd.—Maj. and Bt. Lt.-Col. T. E. Burridge on completion of 28 years' serv. is placed on ret. pay (Sept. 3), and is granted the rank of Lt. Col.

The follg. to be Lts. (on prob.) (Sept. 3):—J. L. Dalzell, D. I. C. Tennant.

REGULAR ARMY RESERVE OF OFFICERS

Lt.-Col. T. E. Burridge (Maj. and Bt. Lt.-Col., ret. pay), to be Lt.-Col. (Sept. 3), with seny. Nov. 3, 1931.

* * * * *

"THE MENACE OF QUACKERY"

"As diagnosis becomes accurate, quackery perforce walks out of the door." The force of this quotation (by an N.V.M.A. Congress speaker) from the paper read by Dr. C. B. Heald to the Section of Physical Medicine of the Centenary Meeting of the British Medical Association, was readily recognised by veterinarians at Folkestone, and similarly other points made in the discussion of this subject by our confrères are worthy of note. Dr. Heald divided quackery into two types: the charlatan and the ignoramus. The former he dismissed as being of little danger, since his results were poor. The latter he subdivided into (*a*) the unqualified practitioner, (*b*) the manufacture of apparatus, and (*c*) the qualified quack. He considered the menace presented by these types to be in that order. Much scope was left for these persons by the loose diagnosis with which the orthodox profession was content in lesions which presented but few gross physical abnormalities. From this source emanated a suggestion that the flood of quack appliances should be stemmed by the establishment of a committee for investigating claims for apparatus.

Misplaced and uncritical enthusiasm for treatments whose chief claim to attention lay in the fact that they were modern was deplored by many and their exponents warned against the dangers of uncertain dosage and indiscriminate application. Stress was laid upon the value of the centralisation and diffusion of knowledge resulting from such discussions.

. . . . .

RADIATIONS IN THE TREATMENT OF INFLAMMATION

Complaint was made in the Section of Radiology that radiologists were judged and condemned on their success with malignant disease and were not given credit for the successful results often achieved in inflammatory conditions.

Dr. Webster, speaking of acute inflammations, said that Heidenham and Fried stimulated research on this subject by their report on 243 cases in 1924. Since then many conditions had been treated by radiations, including axillary abscess, kidney and appendix abscess and acute mastitis. With regard to chronic infections, actinomycosis reacted well, but it was on tuberculous lesions of all kinds that the greatest success had been attained. Dosage must be small in order not to destroy the tubercle, which was a defence mechanism. Of the skin diseases, acne and the eczemas responded well, while good reactions to X-rays were often obtained from indolent surgical sinuses. Ocular inflammations, sepsis associated with malignant disease, gastric and duodenal ulcers were important and rapidly increasing spheres of usefulness. X-rays were to be preferred to radium, and, as to the mode of action of radiations, recent experiments had shown that micro-organisms were destroyed, an action that had previously been denied by many.

During the discussion, advocates were not wanting for the use of ultra-violet light in combination with X-rays, while some dissent was expressed from the view that X-rays in therapeutic doses were bactericidal, or that the increased production of fibroblasts was other than a normal process. X-rays caused a beneficial reaction akin to inflammation over a wide area (Dr. Levitt), and the aim in inflammatory conditions was to maintain this reaction and at the same time to avoid damage to the normal tissues.

* * * * *

ONE DOCTOR TO 1,000 PERSONS

The *British Medical Journal* reviews the numerical strength of the profession, and states that on December 31 last there were 55,604 names on the Medical Register, compared with 23,801 half a century ago. This means that there is now a doctor for every 1,000 of the population. There has been a steady increase in the ratio of doctors to populations, which was accelerated during the years immediately after the War.

"In the United States it is estimated that there is one medical practitioner to every 800 people; Austria has one doctor to every 900 inhabitants; Switzerland one to 1,250; Denmark one to 1,430; Hungary one to 1,480; Germany one to 1,560; France 1 to 1,690; Holland one to 1,820; Czechoslovakia one to 1,970; and Sweden one to 2,860."

* * * * *

BULL RECORDING

"South Devon has led the way in starting a bull recording scheme, while others are still only talking about it," says the *Farmer and Stockbreeder*. "Some who have examined the possibilities have been rather frightened by the apparent complications and amount of work entailed. Some, however, had looked askance at milk recording for the same reason, and as appearances proved to be more formidable than realities in the one case so they may prove to be in the other.

"The South Devon scheme removes the possible misconception that bull recording is an attempt to provide an arithmetical substitute for skill in breeding. Like milk recording, of which it is a logical development, it is no more than an aid to skilled judgment."

* * * * *

FREEZING TEST FOR MILK

Taunton County Magistrates on Saturday of last week heard what amounted to a test case of the alleged adulteration of milk, which resulted in the dismissal of the summons, with costs against the prosecution.

The defendant was Walter J. Warren, of Deacon's Farm, Staplegrove, Taunton, a well-known Somerset exhibitor. He was summoned for having on May 23 last sold milk containing 8 per cent. of added water, to the prejudice of the purchaser.

The alleged adulterated sample had been drawn from a churn of milk at the farm in the early morning before the retailer received it. The case resolved itself into a conflict of expert opinion between analysts called for the prosecution and the defence, the chief point of contention being the freezing test which had been applied to the sample.

Mr. John Hanley, of Bootle, giving evidence for the defence, said he did not agree that the freezing test could be relied upon, because he had found it to vary considerably. When testing milk from the cows on the defendant's farm on two days in August he had found the freezing point below the percentage average given by the prosecution. He said there was no positive test to detect added water in milk.

Mr. F. W. Willmott, for Mr. Warren, asked that the case should be dismissed, with costs, contending that the prosecution had failed. The

case was one that should never have been proceeded with when the Government chemist's certificate stated that the results of his analysis did not form evidence of the presence of added water.

The Bench, as stated, dismissed the summons, with costs against the prosecution.

* * * * *

TWENTY-NINE DOGS IN A HOUSE

A lady resident at Southend was recently summoned by the corporation, who applied for an order under the Public Health Act requiring her to abate a nuisance caused by the presence of 29 dogs on her premises. Mr. R. A. Shorter, who prosecuted, said that on August 28 the chief sanitary inspector went to the house and saw the defendant. He asked her how many dogs she had in the house, and she said, "Seven." He searched the premises, and in a number of nooks and crannies, in drawers, bedrooms, and the coal cellar found in all 29 dogs and a rabbit. An order was made for an abatement of the nuisance. For keeping 19 of the dogs without licences a fine of £5 was imposed.

* * * * *

TURBINE OR COW: CITY CHILDREN'S KNOWLEDGE

"I hope you will be able to spare a few of your precious lines in the interest of very many urban youngsters who are now being educated," writes Mr. Jon b. M. Kimche in *The Times*.

"I was brought up last week-end against something so obvious that, unless it is rammed down our throats and pushed into the very sockets of our eyes, we shall neither see it nor feel it. I spent Saturday and Sunday among the popular resorts of London's children, snatching their last —or only—chance of a holiday break. At the Zoo eloquent youngsters instructed their sceptical elders about animals from the plains of Asia; serpents from the heart of Africa, birds of mystery and beauty—they knew everything: geography, zoology, and all the rest of the curriculum. At the Science Museum few elders were to be seen, but youngsters of every description. They enlightened me—to whom a machine is the most complex possible way of doing a simple operation—about the possibilities of the aero engine, the working of the automatic telephone, and the intricacies of trains, turbines, and textile machinery. I ruefully thought of my wasted years at school.

"It was then that some evil gnome put it into my head to ask the youngest whether he had ever seen a cow. He was not sure, but he thought he had once seen the picture of one in the papers. I asked them collectively whether they knew what a cow looked like. About the size they were fairly unanimous: about the spread of their arms, or the size of a large dog or 'Hyde Park sheep.' Colour was more contentious. Brown and white, pure white, and cream were most popular; when I added black and white I was hardly believed. Then I asked about the milk—but that was apparently a *faux pas*. They blushed, shut up, and grinned sheepishly. One eight-year-old Bermondseyan with more courage than knowledge volunteered that the cow was an animal with a funny inside: it was a sort of tank full of milk. Questioned about a goat they were even more vague.

"It needs not much reflection. The lama, the zebra, and the cobra they know; the turbine, the generator, and the automatic telephone 'translator' they understand; but the cow is an indecent mystery and a goat something quite incomprehensible.

"Heaven knows, these children are constantly being impressed with the enormity of their obligation to the State. In the circumstances the least the State can do to live up to this rather blatant generosity is to enrich our Zoological Gardens by presenting them with a cow, a goat, a pig, and, perhaps in anticipation, with a horse as well.

"All this is so obvious, Sir, that it needs a considerable letter to make it plain. But, on the whole, it is a very typical comment on our present age."

Correspondence

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

* * * * *

THE ETIOLOGY OF LYMPHANGITIS

To the Editor of the Veterinary Record.

Sir,—Mr. Pillers, in his very interesting paper on the itchy legs of cart horses, mentions that he has been unable to trace the author of a statement to the effect that the entrance of microbes through minute wounds of the skin was the origin of all cases of lymphangitis in horses. You will perhaps permit me to say that the statement occurs in Cadiot's Surgical Therapeutics and was quoted by me in a few notes read at a meeting of the London Counties V.M.S. held at Keswick in 1897 or 8 under the presidency of the late Mr. F. Garnett. This etiology of the condition was not accepted by any member of the society nor by me, though the view appears to be favoured by the author of this paper and by some of those present at the meeting of the Yorkshire V.M.S. I should like to recall cases of the malady which I recorded in the *Veterinary Record* some years ago.

Two cart mares (pedigree shires) heavy in foal were at grass in the late spring. A gate being left open they got into the farmyard in which was a wagon filled with freshly-cut tares. The mares were not discovered until they had gorged themselves with the fodder. Next day both were affected with acute lymphangitis. Each received a ball containing aloes and calomel and had the inside of the affected limb dabbed with a solution of perchloride of mercury and salt and a perfect recovery resulted.

One Saturday morning a large wagon load of tares was brought into the yard where a stud of forty or fifty horses was stabled. The animals received a good supply of the green food on Saturday and Sunday and on Monday morning I was sent for to attend to five of the horses for lymphangitis. They were treated as in the former cases and all did well. These animals were vanners and gave no evidence of itchy legs.

With regard to local treatment of these cases, a client of mine said to me one day: "How is it that we never get thick legs here after 'weed'? At my father's place every other case used to be followed by a thick leg after they got better."

I replied: "Your father had the leg fomented"? "Rather," was the answer, "half through the night sometimes." I told him that the application of the hot water made the difference.

Yours faithfully,
W. R. Davis.

Rhyl.